ORIGINAL ARTICLE

Regional anesthesia in transurethral resection of prostate (TURP) surgery: A comparative study between saddle block and subarachnoid block

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ABSTRACT

Background: Spinal anesthesia is the technique of choice in transurethral resection of prostate (TURP). The major complication of spinal technique is risk of hypotension. Saddle block paralyzed pelvic muscles and sacral nerve roots and hemodynamic derangement is less. **Aims and objectives:** To compare the hemodynamic changes and adequate surgical condition between saddle block and subarachnoid block for TURP. **Material and methods:** Ninety patients of aged between 50 to 70 years of ASA-PS I, II scheduled for TURP were randomly allocated into 2 groups of 45 in each group. Group A patients were received spinal (2 ml of hyperbaric bupivacaine) and Group B were received saddle block (2 ml of hyperbaric bupivacaine). Baseline systolic, diastolic and mean arterial pressure, heart rate, oxygen saturation were recorded and measured subsequently. The height of block was noted in both groups. Hypotension was corrected by administration of phenylephrine 50 mcg bolus and total requirement of vasopressor was noted. Complications (volume overload, TURP syndrome etc.) were noted. **Results:** Incidence of hypotension and vasopressor requirement was less ($P < 0.01$) in Gr B patients.Adequate surgical condition was achieved in both groups. There was no incidence of volume overload, TURP syndrome, and bladder perforation. **Conclusion:** TURP can be safely performed under saddle block without hypotension and less vasopressor requirement.

Key words: *Saddle block, spinal anesthesia, transurethral resection of the prostate*

INTRODUCTION

Transurethral resection of the prostate (TURP) is the most common surgical intervention for patients with benign prostatic hyperplasia. Spinal anesthesia is the technique of choice in TURP. There is a chance of circulatory overload due to excessive absorption of irrigation solution through open prostatic venous sinuses during the surgical procedure. Surgery is performed in lithotomy position. Increased venous return due to lithotomy position may aggravate the situation. TURP patients are particularly vulnerable to volume overload as most of them belong to elderly age group and suffer from cardiopulmonary disorder. Spinal anesthesia helps in peripheral pooling of blood , reducing the chance of circulatory overload and early detection of complications like TURP syndrome, bladder perforation. Other advantages of spinal technique are it provides post-operative analgesia, reduces blood loss during surgery and prevents the need for tracheal intubation that may irritate the airway leading to coughing and straining and may exacerbate postoperative hemorrhage. Spinal anesthesia helps in reducing deep vein thrombosis that is beneficial in TURP patients.

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The major problem of spinal technique is risk of hypotension. In spinal anesthesia due to sympathetic blockade, there is vasodilatation leading to diminished venous return which is the main contributory factor for hypotension. The chemical sympathectomy due to spinal anesthesia extends for 2-6 dermatomes above the sensory level and at the same level with epidural anesthesia. In elderly patients with cardiac disease systemic vascular resistance may decrease 25% whereas in normovolumic healthy patients it may decrease only 15-18%.[1] This hypotension is usually corrected by either administration of intravenous (i.v) fluids or vasopressor. But liberal use of i.v fluid administration is

dangerous particularly elderly patients with compromised cardiopulmonary function. The hemodynamic swinging is more 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 anesthesia. Saddle block paralyzed pelvic muscles and sacral nerve roots. As lower level of block is achieved, hemodynamic derangement is less and fluid requirement is also less. So there is minimum chance of circulatory overload. Considering all these merits and demerits of regional block, the aim of our study is to compare the hemodynamic changes, vasopressor requirement and adequate surgical condition between saddle block and subarachnoid block for TURP operation.

MATERIALS AND METHODS

This prospective randomized comparative study was performed after obtaining consent approval from institutional ethics committee for six months. After taking written informed consent 90 patients of aged between 50 and 70 years of AmericanSociety of Anesthesiologist physical status I,II having prostatic volume of 30-80 cc with approximate operation time of 60-90 mins scheduled for TURP were selected for our study. Taking into consideration the results of previous studies with an alpha error of 0.05 and a power of 80%, we calculated the sample size should be at least 30 patients per group. Those having contraindication of regional anesthesia (local site infection, coagulopathy, neurological disorder) were excluded from our study.

Anaesthetic procedure and protocol

In the operating room i.v. access was done with 18 gaze cannula and patients were co-loaded with normal saline at a rate of 6 ml/kg/hr. Standard monitors were attached to record heart rate (HR), non-invasive blood pressure (BP), electrocardiography and oxygen saturation (SpO_2).

The study population was randomly allocated into two groups of 45 in each group in the following way: Group A: received 2 ml of 0.5% bupivacaine with 25 gaze pencil point tip needle at L3-L4 or L4-L5 inter-vertebral space via midline or paramedian approach in sitting position after ensuring free flow of cerebrospinal fluid. Patients were placed supine with one pillow after administration of the drug in the subarachnoid space. Group B received 2 ml of hyperbaric 0.5% in the same manner as Group A but were remained in the sitting position for 10 minutes and then were made supine with one pillow under the head. If block was not achieved, we excluded the patients from our study. Baseline systolic BP, diastolic BP and mean arterial pressure (MAP), HR, SPO_2 were recorded before administration of the drug intrathecally and then at 5 minutes interval during the intraoperative period. If MAP falls >20% of baseline value i.v phenylephrine at a dose of 50 mcg bolus was given and repeated after 5 min if required. If HR was < than 60/min, Atropine (0.6 mg) i.v was given.

The level of sensory block was assessed by temperature (cold) sensation bilaterally and height of the block was noted in both groups. Motor block was tested using modified Bromage scale as: 0 = no block, 1 = inability to raise the extended leg, 2 = inability to flex the knee, 3 = inability to flex the ankle joint or great toe. The operating condition was assessed by block height and adequate relaxation of pelvic floor muscles. TURP was performed with a Storz 24 Fr resectoscope by the same surgeon by 1.5% glycine. Any complication like TURP syndrome, congestive cardiac failure, bladder perforation was noted.

Statistics

Data were analyzed by SPSS 16.0 (Statistical Package for the Social Sciences Inc, Chicago, IL, USA). version. Numerical variables were compared among t hese groups by independent t test. All analysis was two tailed and *P* value < 0.05 was considered as statistically significant.

RESULTS

The two groups were comparable regarding age, weight, height, duration of surgery [Table 1]. The baseline SBP, DBP, MAP, HR, SpO_2 were comparable between the two groups [Table 2]. Baseline SBP, DBP, MAP, HR, SpO2 (Mean±SD): The fall of SBP, DBP, MAP was less in Group B (saddle) than Group A (spinal) which was statistically significant [Table 3 and Figures 1 and 2]. Fall of HR was more in Group A (11.84±5.85) than Group B (4.76±2.01) which was statistically significant (*P*<0.0001). Phenylephrine requirement was significantly less in (Group B) [Table 4 and Figure 3].

Table 4 Phenylephrine consumption in both groups:

DISCUSSION

The nerve supply to the prostate originates from the inferior hypogastric plexus and carries both sympathetic fibers from T11 to L2 and parasympathetic fibers from S2 to S4. Pain fibers from the prostate, prostatic urethra and bladder mucosa originate from S2 to S4 sacral nerves. Pain signal from bladder distension travels along with T11 to L2 sympathetic fibers. The stretch sensation of bladder is carried by parasympathetic fibers of S2 to S4. Considering this innervation, height of regional block up to T10 is sufficient for TURP operation. Higher level of block may mask the pain on perforation of the prostatic capsule [Table 5].

Spinal anesthesia is technique of choice in TURP but the height of the block should not cross T10 level. Various factors (baricity of anesthetic solution, age, position of the patient, drug dosage, site of injection, drug volume) influence the height of block following spinal anesthesia. There is no dose specification for per segmental spread in spinal anesthesia unlike epidural technique. Toumiren stressed that concentration and volume of local anesthetics along with position during and after injection are the major factors affecting the distribution of local anesthetics.[2] Pitkänen *et al.* suggested that administration of 10 mg of 0.5% hyperbaric bupivacaine produce less fall of BP compared to other local anesthetics and hemodynamic differences may be very low even in elderly patients if enough prehydration is provided.[3] Other studies also used 2 ml of hyperbaric bupivacaine in TURP.[4] So we used 10 mg of 0.5% hyperbaric bupivacaine in each group of our study population. There is a chance of the highest risk of irrigation fluid absorption during spinal anesthesia with spontaneous ventilation due to fall of central venous pressure coupled with negative intrathoracic pressure in comparison during general anesthesia either with spontaneous or mechanical ventilation.[5] Saddle block sets up quickly, paralyzed pelvic muscles and sacral nerve roots

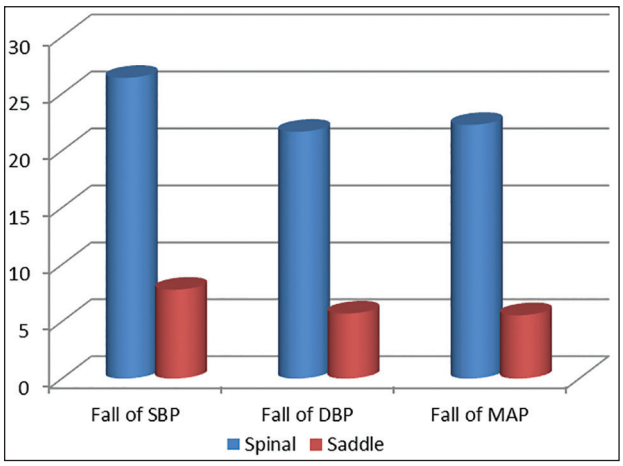

Figure 1: Fall of SBP, DBP, MAP

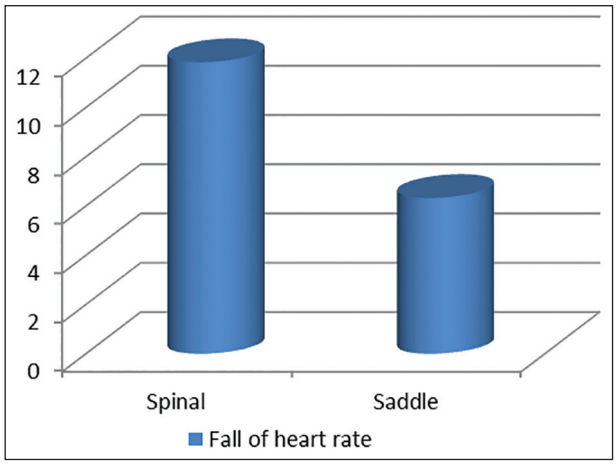

Figure 2: Fall of heart rate in both the groups

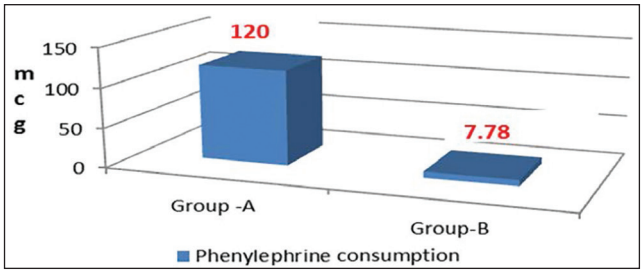

Figure 3: Phenylephrine consumption between two groups

Table 1: Demographic data: Age, Weight, Height, duration of surgery

Variables	Spinal (gr. A)	Saddle (gr. B)	*P*-value
Age (years)	62.64±3.83	63.33±4.16	0.416
Weight (Kg)	53.93±9.28	53.29±9.31	0.743
Height (cm)	161.84±3.84	162.36±1.71	0.418
Duration of surgery (min)	82.49±1.53	82.27±1.01	0.419

Table 2: Baseline SBP, DBP, MAP, HR, SpO_2 (Mean ± SD)

Baseline	Gr. A	Gr. B	*P*-value
SBP (mmHg)	135.87±3.24	134.27±4.54	0.06
DBP (mmHg)	84.20±4.78	84.20±5.23	0.21
MAP (mmHg)	100.40±3.85	99.09±4.43	0.137
HR (mins)	89.40±7.81	88.40±4.81	0.467
Spo_2 (%)	99.87±0.97	99.80±1.01	0.750

Table 3: Maximum fall of SBP, DBP, MAP in two groups

Maximum change of BP (mmHg)	Gr. A	Gr. B	*P*-value
SBP	26.40±1.47	6.42±4.15	<0.0001
DBP	21.67±4.82	6.76±5.43	<0.0001
MAP	22.27±3.01	6.73±3.96	<0.0001

Table 4: Phenylephrine consumption in both groups

Groups	Phenylephrine consumption (μg)
Spinal (Gr. A)	120±30.90
Saddle (Gr. B)	7.78±2.60
P-value	<0.0001

Table 5: Fall of heart rate in two groups

Groups	Fall of heart rate
Gr. A	11.84±5.85
Gr. B	4.76±2.01
P-value	<0.0001

and height of the block is less. So there is less chance of hypotension. In saddle block lowest amount of drug is administered intrathecally and patients are allowed in sitting posture till the drug is fixed. Saddle block is used mainly for anal and perineal surgeries. We used higher doses (2 ml) than a conventional saddle technique but allow sufficient time to settle down hyper baric bupivacaine to achieve higher block level.

We found that the hemodynamic changes were more in in the spinal group (Group A) than the saddle group (Group B). Maximum fall of SBP, DBP, MAP of Group A were 26.40 ± 1.47, 21.67 ± 4.82, 22.27 ± 3.01 and those of Group B were 6.42 ± 4.15, 6.76 ± 5.43, 6.73 ± 3.96 respectively and this fall of BP were statistically significant ($P < 0.0001$). Fall of HR was more in Group A (11.84± 5.85) than Group B (4.76 ± 2.01) which was statistically significant ($P < 0.0001$). Phenylephrine consumption was significantly less in Group B (7.78 ± 2.60) than Group A (120 ± 30.90) which was statistically significant ($P < 0.0001$). Surgical anesthesia was achieved in both groups. Motor block was less in Group B (modified Bromage scale 1) than Group A (modified Bromage scale 3). There was no incidence of TURP syndrome, congestive cardiac failure but one case of bladder perforation occurred in Group A which was treated by conservative approach.

Dobson *et al.,* administered spinal and general anesthesia in TURP patients and compared their efficacy. They found that general anesthesia produce more hemodynamic difference after induction.[6] Bowmen compared post-operative pain in TURP patient after giving spinal and general anesthesia and found that spinal group required less post-operative analgesic.[7] Blake found that blood loss was less during regional than general anesthesia.[8] Gurajala *et al.* performed performed saddle block with 1ml of hyperbaric bupivacaine mixed with 50 mcg fentanyl in patient with aortic and mitral valve replacement for TURP without any deleterious cardiovascular effect.[9] Hartmann *et al.* found 20-30% incidence of hypotension after spinal anesthesia.[10] Ozmen *et al.*[4] compared epidural (75 mg hyperbaric bupivacaine mixed with 50 mcg fentanyl), spinal (15 mg hyperbaric bupivacaine mixed with 50 mcg fentanyl), saddle (10 mg hyperbaric bupivacaine mixed with 50 mcg fentanyl) anesthesia during TURP. They found that intraoperative systolic arterial pressure and SpO_2 remained more stable and sufficient surgical anesthesia was achieved quickly without statistically significant motor block ($P < 0.001$) in the saddle group. All these findings corroborate with our results. But fall of heart rate were significant (P value < 0.05) in three groups. Rooke GA, Freund PR, Jacobson AF studied cardiovascular effects of spinal anesthesia on fifteen elderly patients with heart disease to evaluate the consequences of hemodynamic changes which may be more deleterious for them and their observation was fall of heart rate by 10% in five subjects and rise of heart rate by 10% or more in four subjects but not more than 90/min.[1] Jindal *et al.*[11]found that fall of heart rate was more (21%) following spinal anesthesia than epidural (17%) and general anesthesia (14%). In our study we also found that fall of HR was more in Group. A (11.84 ± 5.85) patients received spinal anesthesia than gr. B (4.76 ± 2.01) received saddle block which was statistically significant ($P<0.0001$).

Limitations of the present study include we administered higher doses of bupivacaine than conventional dose in saddle block, did not estimate serum sodium, did not measure blood loss and absorption of irrigation fluid.

In conclusion, transurethral resection of the prostate can be safely performed under saddle block with less chance of hypotension and less vasopressor requirement.

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