JMALS

Journal of Medical and Life Science

https://jmals.journals.ekb.eg/

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A STUDY TO COMPARE THE EFFICACY OF SUBARACHNOID BLOCK VERSUS SADDLE BLOCK COMBINED WITH ULTRASOUND GUIDED OBTURATOR NERVE BLOCK FOR TRANSURETHRAL RESECTION OF PROSTATE: A RANDOMIZED CONTROLLED TRIAL

[1]Dr Shalini Jain, [2]Dr Kajal Jain, [3]Dr Nidhi Sharma, [4]Dr Manish Banjare

[1]Professor, Department of Anaesthesia, MGM Medical College, Indore (M.P.), India
Email: drshalininjain@gmail.com

[2]PG 3rd yr Student, Department of Anaesthesia, MGM Medical College, Indore (M.P), India
Email: kj02071994@gmail.com

[3]Assistant Professor, Department of Anaesthesia, MGM Medical College, Indore (M.P.), India
Email: drnidhisharma1004@gmail.com

[4]HOD and Professor, Department of Anaesthesia, MGM Medical College, Indore (M.P.), India
Email: manish-banjare@yahoo.co.in

DOI:10.21608/jmals.2025.409494.1062

ABSTRACT

Background: Regional anaesthesia is often chosen over general anaesthesia for transurethral resection of prostate (TURP) due to a better safety profile. Subarachnoid block (SAB) is a long-standing technique; it may cause hypotension and bradycardia, which is concerning in the elderly. Saddle block by acting on sacral nerve roots gives sufficient anaesthesia to the perineal region while maintaining stable hemodynamics. Combining it with ultrasound-guided obturator nerve block (ONB) helps reduce thigh adduction during resection, thus lowering the risk of bladder injury and improving surgical ease. This study aimed to assess the difference between SAB and saddle block plus ONB in terms of blood pressure stability, motor block, and satisfaction of the surgeon. **Methods:** Eighty male patients aged 50 to 75 years with American Society of Anesthesiologists (ASA) I to III posted for elective TURP were randomly assigned into two equal groups(CTRI/2024/04/065037). Group A received SAB, while Group B got saddle block plus USG-guided ONB with 12 ml of 0.5% bupivacaine. Mean arterial pressure, heart rate, systolic BP, time to reach T10 sensory level, motor block grading, surgeon satisfaction, and any intraoperative issues were recorded. **Results:** Group B had more stable vitals. Motor block was deeper in Group A. Time to achieve T10 was slightly delayed in Group B. Surgeon satisfaction was better in Group B. Complications like hypotension and bradycardia occurred more in Group A. **Conclusion:** Saddle block with obturator block may be a safer and effective approach in the elderly undergoing TURP, offering better stability and faster recovery.

Keywords: Subarachnoid block, saddle block with ultrasound-guided obturator nerve block, Benign prostatic hyperplasia, Transurethral resection of prostate.

Received: August 1, 2025. Accepted: September 12, 2025. Published: September 30, 2025

Introduction

Benign Prostatic Hyperplasia (BPH) is a common urological issue in elderly males, especially above 55 years of age. This population often has reduced physiological reserve due to comorbid illnesses, muscle loss, and chronic disease duration [1]. Transurethral Resection of the Prostate (TURP) remains the standard surgical approach for bladder outlet obstruction caused by BPH. It is a minimally invasive endoscopic procedure that removes enlarged prostatic tissue while preserving the capsule [1,2]. TURP is effective in relieving lower urinary tract symptoms and improving quality of life in these patients [3].

Both general and regional anaesthesia techniques can be used for TURP. However, regional anaesthesia is usually preferred due to its advantages like early recognition of TURP syndrome, reduced intraoperative blood loss, better analgesia, and avoidance of airway-related complications such as bronchospasm and aspiration [1,4,5]. It is also more suitable for patients with pre-existing respiratory issues and offers effective postoperative pain control. Among regional options, subarachnoid block (SAB) has been most commonly used but carries the risk of hypotension and bradycardia due to sympathetic blockade and venous pooling [5].

Saddle block, by selectively targeting sacral nerves, gives adequate perineal anaesthesia with less cardiovascular compromise [2]. It avoids sympathetic block, which makes it hemodynamically safer in the elderly [6]. Most prostate pain is transmitted through pelvic splanchnic nerves (S2–S4), while bladder distension pain is mediated via sympathetic fibres (T11–L2). Hence, a sensory level up to T10 is enough for TURP [1].

However regional block alone does not eliminate the obturator jerk. This sudden thigh adduction due to stimulation of the obturator nerve may lead to complications like bleeding, bladder perforation, or incomplete resection. This can be prevented by adding an ultrasound-guided obturator nerve block (ONB), which improves muscle relaxation, surgical safety, and surgeon satisfaction [4,7]. Ultrasound guidance allows accurate needle placement, better visualization of anatomy, and fewer complications [8].

This study was conducted to compare hemodynamic effects, degree of motor block, and surgeon satisfaction in TURP patients receiving either a subarachnoid block or saddle block combined with ultrasound-guided obturator nerve block.

MATERIAL AND METHODS

Following approval from the Institutional Ethics and Scientific Review Committee, this randomized controlled trial (Registered- CTRI/2024/04/065037) was conducted in the Department of Anaesthesiology, M.G.M. Medical College and M.Y. Hospital, Indore, Madhya Pradesh, India, over a period of 12 months (October 2023 to October 2024).

A total of 80 patients aged 50-75 years belonging to ASA I-III scheduled for TURP were included in the study. Participants were explained the study's objectives, methodology, and expected outcomes in their vernacular language. 80 Patients were divided into two groups by computer computer-generated method (40 in each group). Patients in Group A received a subarachnoid block, and patients in Group B received a saddle block combined with an ultrasound-guided obturator nerve block.

After proper pre-anaesthetic evaluation and obtaining informed consent, patients were kept NPO for 6 hours before surgery. In the operating room, routine monitoring was instituted, including ECG, non-invasive blood pressure (NIBP), pulse oximetry (SpO_2), and baseline vitals were recorded. After securing an IV Line with an 18G catheter, patients were preloaded with normal saline 10ml/kg for a period of 20 minutes before administering regional anaesthesia.

Patients in Group A were given a subarachnoid block using 2.5 ml 0.5% hyperbaric bupivacaine in the L3-L4 intervertebral space by a 25 G Quincke spinal needle via median approach in sitting position under

full aseptic precaution. Immediately after intrathecal injection, the patient was placed in a supine position. Sensory blockade was tested by the wet swab test, and motor blockade was tested by the modified Bromage scale every 5 minutes for 20 minutes.

For the patients in Group B, saddle blocks were given using 2.5 ml of 0.5% hyperbaric bupivacaine in the L3-L4 intervertebral space by a 25 G Quincke spinal needle via median approach in sitting position under full aseptic precaution. After administering the drug, patients were kept in a sitting position for the next 8 minutes, then were positioned supine. Sensory and motor blockade were tested every 5 minutes for 20 minutes by the wet swab test and modified Bromage scale, respectively. Simultaneously, after attaining the supine position, Ultrasound ultrasound-guided obturator nerve block was given, and the desired anaesthetic effect was confirmed.

Hemodynamic monitoring was done every 2 minutes after the regional anaesthetic block for the first 10 minutes and then every 15 minutes till the end of surgery. The time to reach maximum sensory blockade and maximum motor blockade will be recorded. Any complications during the intraoperative period were dealt with by necessary medical intervention.

STATISTICAL ANALYSIS:

Data was entered first in Microsoft Excel, then exported to SPSS software version 25.0 for final analysis. Continuous variables like age, duration, etc, were shown as mean ± standard deviation. Categorical data like ASA class, type of complications, etc, were expressed in proportion or percentage form. For comparing qualitative data Chi-square test was used, and if the expected count was low, then Fisher's exact test was applied. Quantitative variables between groups were compared using Mann Mann-Whitney U test since the data were not normally distributed. For the within-group comparison of repeated measures, the Friedman test was done. A p-value less than 0.05 was taken as significant.

RESULTS:

A total of 80 patients were recruited and randomly divided into 2 equal groups. Group A received a subarachnoid block, and Group B got a saddle block along with an ultrasound-guided obturator nerve block. Mean age in Group-A was 67.18 ± 6.57 years and in Group-B 66.68 ± 5.81 years (p = 0.556). Mean body weight was 72.08 ± 5.83 kg in Group A and 73.90 ± 5.48 kg in Group B. Mean height of patients in Group A was 169.63 ± 5.45 cm vs 167.65 ± 5.98 cm in Group B. Surgery time was also similar – mean 81.75 ± 20.37 min in Group A and 82.88 ± 15.19 min in Group B. Statistical tests showed no significant difference across these variables (p > 0.05) so both groups were comparable in age, weight, height and surgery duration.

Table 2: Patients are classified based on the ASA physical status classification. 30% classified as grade I, indicating they were normal healthy individuals, Grade II patients accounting for 43.8% had mild systemic disease, while 26.3% were in grade III, suffering from severe systemic disease. Distribution of patients as per ASA grade was statistically insignificant between the two groups (P =0.0732).

Table 3 presents the Mean arterial pressure fluctuation at various time points. the baseline MAP was 89.33±8.32 mmHg in Group A and 87.63±10.60 mmHg in Group B. In Group-A, MAP fell slightly at 2 minutes (88.38±9.23) and this trend continued till 45 minutes (77.30±10.80 mmHg), then there was an increase in MAP towards the baseline (80.63±9.27) at 60 minutes. and was maintained throughout the surgery. In Group B, MAP fell at 2 minutes (84.83±9.17) after intrathecal injection, and this fall continued till 10 minutes (81.83±9.02 mmHg), then increased in MAP toward baseline and maintained throughout the surgery.

Mean MAP was significantly lower in Group-A than Group-B at 4,6,8,10,15,30,45and 60 minutes. No statistically significant difference was observed at baseline, 60,90,105, and 120 minutes (p values >0.05).

TABLE 1: Demographic Data

Parameters	Group-A (Mean±SD)	Group-B (Mean±SD)	p-value
Age	67.18±6.57	66.68±5.81	0.556
Weight	72.08±5.83	73.90±5.48	0.102
Height	169.63±5.45	167.65±5.98	0.162
Duration of surgery	81.75±20.37	82.88±15.19	0.726

TABLE 2: ASA PHYSICAL STATUS

ASA Physical Status	Group-A	Group-B	Total	p-value
Grade I	11 (27.5%)	13 (32.5%)	24 (30%)	0.732 (NS)
Grade II	17 (42.5%)	18 (45.0%)	35 (43.7%)	
Grade III	12 (30.0%)	9 (22.5%)	21 (26.3%)	
Total	40 (100%)	40 (100%)	80 (100%)	

Table 3: Comparison of MEAN ARTERIAL PRESSURE BETWEEN TWO GROUPS

Mean Arterial Pressure (MAP) (mmHg)	Group-A (Mean±SD) (n=40)	Group-B (Mean±SD) (n=40)	p- value
Baseline	89.33±8.32	87.63±10.60	0.086
2 Min	88.38±9.23	84.83±9.17	0.041
4 Min	79.00±10.04	83.80±8.95	0.043
6 Min	77.43±11.21	83.08±9.22	0.013
8 Min	76.80±10.21	82.10±10.08	0.030
10 Min	75.15±9.63	81.83±9.02	0.004
15 Min	75.45±9.18	82.38±10.29	0.002
30 Min	77.10±10.32	82.73±9.92	0.007
45 Min	77.33±10.80	82.80±8.49	0.017
60 Min	80.63±9.27	81.88±8.66	0.503
75 Min	82.00±10.60	81.38±7.93	0.985
90 Min	81.78±7.93	81.40±7.32	0.751
105 Min	82.28±10.54	81.45±7.40	0.851
120 Min	82.85±10.51	81.85±7.42	<0.765
Friedeman test	0.0001	0.003	

Table 4 summarizes heart rate measurements at various time points. In Group-A, the baseline heart rate was 74.33±7.75 per minute, and this fell at 2 minute and this fall continued till 60 minutes then there was increase in heart rate and was maintained till end of surgery In Group-B baseline heart rate was 76.85±9.28 per minutes and this fell slightly at 2 minute and increase slightly at 4 minute after that it was maintained throughout the surgery. No statistically significant difference was observed in heart rate at baseline, 2,75,90,105, and 120 minutes between the two groups. Mean±SD of heart rate (per minute) in patients of Group-A at 4,6.10,15,30,45, and 60 was significantly lower as compared to Group-B.

TABLE 4: COMPARISON OF HEART RATE BETWEEN TWO GROUPS

HEART RATE	Group-A (Mean±SD)	Group-B (Mean±SD)	p-value (Mann-Whitney U test)
Baseline	74.33±7.75	76.85±9.28	0.190
2 Min	72.95±9.99	75.90±9.96	0.150
4 Min	69.75±10.27	77.78±10.54	0.001
6 Min	67.08±9.95	78.03±10.20	<0.0001
8 Min	64.77±9.45	77.55±10.25	<0.0001
10 Min	64.52 8.42	77.82±10.60	<0.0001
15 Min	64.80±9.62	77.93±9.42	<0.0001
30 Min	63.63±10.11	78.45±8.78	<0.0001
45 Min	63.15±7.54	78.95 ±8.51	<0.0001
60 Min	63.95±8.37	78.63±9.06	<0.0001
75 Min	73.73±7.63	76.95±8.95	0.099
90 Min	73.88±8.10	77.95±9.47	0.052
105 Min	75.08±7.34	78.28±9.67	0.093
120 Min	75.30±7.99	78.28±9.59	0.117
Friedeman test	0.0001	0.408	

Table no. 5 summarizes the comparison of the trend of systolic blood pressure (mmHg) at different time intervals between Group A and Group B. In Group-A, the baseline systolic blood pressure was 131.05±12.25 mmHg, and this fell slightly at 2 minutes, and this fall continued till 45 minutes, and then increased in systolic blood pressure to the normal level and was maintained till the end of surgery. In Group B, the baseline systolic blood pressure was 128.68±8.09 mmHg, and this fell slightly at 2 minutes, and this fall continued till 8 minutes, then increased in systolic blood pressure to the normal level and maintained till the end of surgery. Mean±SD of systolic blood pressure (mmHg) in Group-A at 4,6,8,10,15,30,45, and 60 minutes was significantly lower as compared to Group-B ($p<0.05$), while no significant difference was seen in systolic blood pressure (mmHg) at all other time intervals.

Table 5 COMPARISON OF SYSTOLIC BLOOD PRESSURE BETWEEN TWO GROUPS

Systolic Blood Pressure	Group-A (Mean±SD)	Group-B (Mean±SD)	p-value (Mann-Whitney U test)
Baseline	131.05±12.25	128.68±8.09	0.214
2 Min	125.40±14.94	125.68±7.16	0.754
4 Min	115.62±15.84	125.53±6.97	0.001
6 Min	110.48±14.20	123.03±8.52	<0.0001
8 Min	109.10±10.62	120.23±16.73	<0.0001
10 Min	109.80±12.35	125.28±7.50	<0.0001
15 Min	112.70±12.45	124.00±7.85	<0.0001
30 Min	111.48±11.25	124.28±8.44	<0.0001
45 Min	113.33±13.32	124.48±9.59	<0.0001
60 Min	118.23±11.36	123.75±8.90	0.019
75 Min	122.18±13.11	127.30±7.57	0.085
90 Min	122.25±13.71	128.05±7.27	0.114
105 Min	122.25±13.71	128.13±6.85	0.307
120 Min	123.45±14.86	127.13±6.75	0.328
Friedem Test P-value	<0.0001	<0.0001	

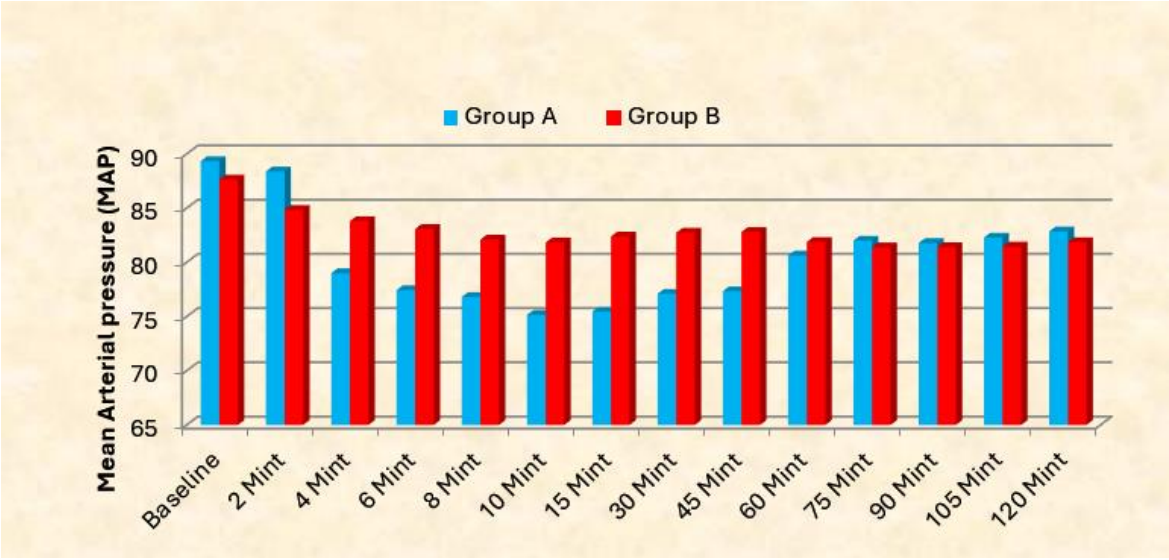

Figure 1: **COMPARISON OF MEAN ARTERIAL PRESSURE BETWEEN TWO GROUPS**

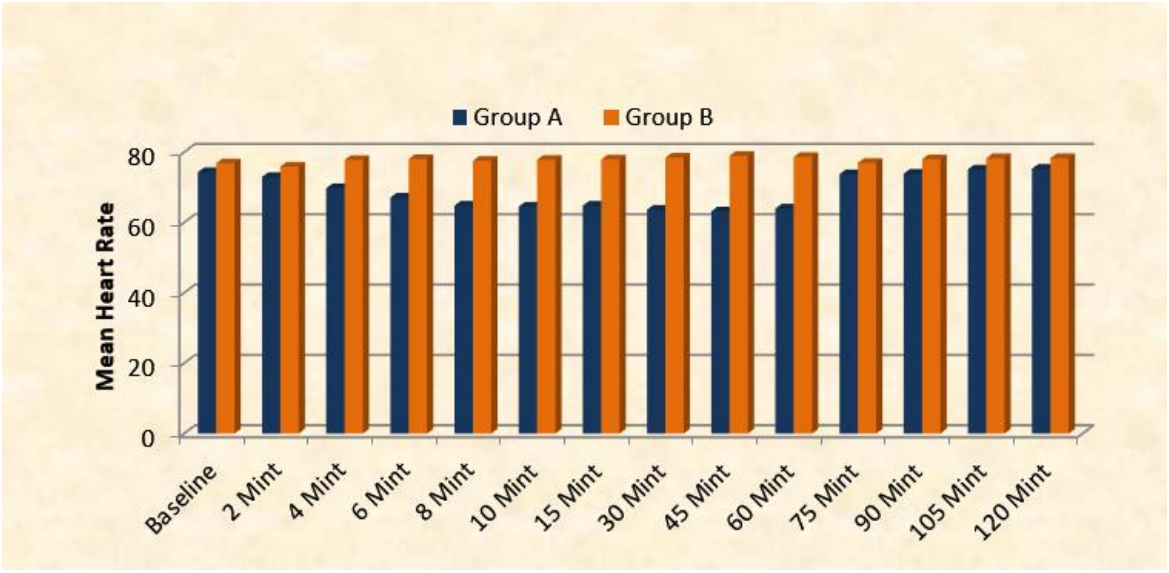

Figure 2: **COMPARISON OF HEART RATE BETWEEN TWO GROUPS**

Table 6: COMPARISON OF INTENSITY OF MOTOR BLOCKADE BETWEEN TWO GROUPS WITH TIME

Intensity of Motor Blockade	**Group-A**	**Group-B**	**p-value**
3 Min	2.88±0.79	5.48±0.64	<0.0001
5 Min	2.28±0.64	4.88±0.82	<0.0001
10 Min	1.88±0.56	4.53±0.87	<0.0001
20 Min	1.58±0.55	4.20±0.82	<0.0001

The above Table shows a comparison of the intensity of motor blockade between the two groups.
A statistically significant reduction in the intensity of motor blockade was recorded in Group B at 3,5,10, and 20 minutes ($p < 0.0001$).

Table 7: COMPARISON OF LEVEL OF SENSORY BLOCKADE BETWEEN TWO GROUPS WITH TIME

	3 min		5 min		10 min		20 min	
	Group-A	Group-B	Group-A	Group-B	Group-A	Group-B	Group-A	Group-B
T-6	-	-	-	-	-	-	3 (7.5%)	-
T-8	1(2.5%)	-	7(17.5%)	-	20(50%)	-	23(57.5%)	-
T-10	10(25%)	-	24(60%)	-	19(47.5 %)	6(15%)	14(35%)	40 (100%)
T-12	19(47.5%)	-	9(22.5%)	-	1(2.5%)	20(50%)	-	
L-1	7(17.5%)	-	-	1(2.5%)	-	2(5%)	-	-
L-2	3 (7.5%)	-	-	3(7.5%)	-	9(11.3%)	-	-
L-4	-	-	-	2(5%)	-	3(3.8%)	-	-
S-2	-	27(33.8%)	-	30(75%)	-	-	-	-
S-4	-	13(16.3%)	-	4(10%)	-	-	-	-
P value	<0.0001		<0.0001		<0.0001		<0.0001	

This table shows the time to achieve the highest dermatomal level between the two groups

The highest dermatomal level achieved in Group-A patients was T-6, while in Group-B patients it was T-10. A comparison of the time taken to achieve sensory blockade between the two groups revealed significant differences. By 5 minutes, all Group-A patients (100%) had achieved a dermatomal level of T8-T12, whereas Group-B patients took a longer time to achieve the T10 dermatomal level (10 min or 20 min).

The time taken to achieve the sensory block up to T-10 was delayed in Group B

Table No. 8 **Comparison of intraoperative complications between the two groups**

Intraoperative complications	**Group-A**	**Group-B**	**p-value**
Hypotension	34 (85.0%)	17 (42.5%)	<0.0001
Bradycardia	28 (70%)	9 (22.5%)	<0.0001
TURP Syndrome	0 (0%)	0 (0%)	-

Table 8 assesses the occurrence of intraoperative complications (hypotension, Bradycardia, and TURP syndrome) between the two groups. In Group A, the proportion of patients experiencing hypotension (85%) was significantly higher as compared to Group B (42.5%). Furthermore, Group A had a significantly higher proportion of patients having bradycardia (70%) compared to Group B (9%). TURP syndrome was not seen in the groups.

On comparing the surgeon satisfaction score between two groups on the basis of surgeon noticed any jerk or muscle contraction during the procedure, and how satisfied are surgeon was with the overall experience during surgery. The high level of surgeon satisfaction (score -6) in 67.5% of Group-B patients highlights the effectiveness of ultrasound-guided obturator nerve block with saddle block in preventing obturator jerk reflex during the surgical procedure and providing a good overall experience during surgery.

Discussion

Spinal anaesthesia reaching the T10 dermatome is generally the preferred technique for TURP among anaesthesiologists worldwide [2,9]. But the common issue with spinal anaesthesia is sudden fluctuation in heart rate and BP [10–12]. These hemodynamic shifts may increase perioperative morbidity, especially in elderly patients with multiple comorbidities [11,12]. So we wanted to find a better method that is safer and gives good anaesthesia with less cardiovascular disturbances [4]. This study was done to compare how well the subarachnoid block works versus the saddle block with ultrasound-guided obturator nerve block during TURP. Obturator nerve block helps in preventing the obturator jerk, which occurs when the nerve gets stimulated during resection [8]. Obturator jerk is dangerous as it can lead to bladder perforation. As shown by Anil Krishna et al., spinal + obturator nerve block significantly reduced the risk of obturator reflex, bladder injury, and even incomplete tumor resection during TURBT surgeries when compared to spinal block alone [13].

In this randomized controlled trial, 80 patients aged 50-75 years belonging to ASA physical status I, II, or III, who underwent TURP, were included. Patients were randomly allocated into two groups of 40 each using a computer-generated method: Group A and Group B. Patients in Group A received a subarachnoid block, while those in Group B received a saddle block combined with ultrasound-guided obturator nerve block.

The mean age, weight, height, ASA physical status, and duration of surgery were comparable between the two groups ($p>0.05$).

Hemodynamic parameters: MAP was comparable between the two groups at baseline, 60, 90, 105, and 120 minutes. It was significantly lower in Group A at 4,6,8,10, 15,30, and 45 minutes as compared to Group B, which was statistically significant ($p<0.05$). on comparing heart rate, the Mean heart

rate in patients of Group-A at 4,6,10,15,30,45, and 60 minutes was significantly lower than compared of Group-B, which was statistically significant ($p<0.05$). On comparing heart rate, we found that there were statistically significant differences between the two groups at 4,6,8,10,15,30,45, and 60 minutes ($p<0.05$).

These results related to hemodynamic changes were consistent with studies by Dr. Deepika Tiwari et al [12] reported in their study that intraoperative fall in HR, SBP, DBP, and MAP was significantly less in saddle block Group-As compared to the spinal block group in patients undergoing TURP. Shahid N et al [2] in their study they found that maximum fall from baseline for systolic blood pressure ($P<0.001$), diastolic blood pressure ($p=0.002$), mean arterial pressure ($p<0.001$), and pulse rate were significantly lower in patients receiving saddle block than in patients who underwent spinal block anesthesia. These findings were also consistent with S. M. Moosvi et al. [9] and Afsar MI et al. [14].

In our study, a statistically significant reduction in intensity of motor blockade was recorded in Group B at 3,5,10, and 20 minutes ($p<0001$). The intensity of motor blockade was higher in Group A. Complete motor blockade was demonstrated in the subarachnoid group, whereas saddle group patients observed partial motor blockade in the study by Tejindra Palb et al. [1] same finding was also found by Bhattacharyya S et al [5].

Time to maximum level block (min) and maximum sensory block level: Both groups achieved adequate dermatomal block up to T10, but the time required to achieve this was longer in the saddle block group. The maximum level of blockade reached in Group A was T6, while Group B remained consistently at T10. These findings are consistent with Kim et al. and further supported by Alkayssi & Jaffa, who noted that targeting both anterior and posterior branches of the obturator nerve, along with a segmental saddle block, allows for a stable T10 sensory level with minimal hemodynamic disturbance and better control of obturator reflex during TURBT [15,16]. Kshetrapal et al. [17] and Sharma et al. [18] also demonstrated that a saddle block with obturator nerve block achieved a lower cephalad spread, better hemodynamic tolerance, and improved intraoperative field stability. Sharma et al. further reported that the obturator jerk was completely absent in 100% of the patients receiving USG-guided ONB compared to 26.6% in the blind group [18]. In contrast, Ozmen et al. [19] had observed that conventional spinal anaesthesia led to rapid and higher sympathetic blockade up to T4, predisposing elderly TURP patients to severe hypotension and bradycardia, cautioning against its widespread use without careful monitoring. Also, Islam et al. [20] compared arterial pressure and phenylephrine requirement between spinal and saddle blocks in 70 patients and found that 60% of spinal group patients needed vasopressor support versus only 25.7% in the saddle group, favoring saddle block in high-risk cardiac patients. Incidence of adverse effects, was as hypotension, was higher in Group-A compared to Group-B (85% vs 42.5%), and bradycardia was also more in Group-A (70% vs 22.5%). These results were supported by N Shahid et al [2] and Bhattacharya et al [5]. Incidence of TURP syndrome was not observed in either group. On comparing the surgeon satisfaction score, we found that patient that patients in Group B have better surgeon satisfaction. Our findings also aligned with Thallaj A et al [11]. P Jindal et al. [10] showed that patients for TURP under spinal anaesthesia have a rapid onset of action, but it may lead to sudden Hypotension compared to the epidural group.

CONCLUSION:

From the present study, it may be concluded that a fall in mean arterial pressure, heart rate, and systolic blood pressure was more pronounced in the subarachnoid block as compared to the saddle block combined with ultrasound-guided obturator nerve block. Saddle block is a safer technique in elderly patients undergoing TURP as it provides optimal

anaesthesia, stable hemodynamics with minimal hypotension, and partial motor blockade resulting in early ambulation of patients.

Conflict of interest: NIL

Funding: NIL

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