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Change in Hemodynamics with Saddle versus Spinal Block in Patients Undergoing Elective Transurethral Resection of Prostate for Benign Prostate Hyperplasia

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ABSTRACT

Objective: To compare the mean change in hemodynamics with saddle block versus spinal block in patients undergoing elective transurethral resection of prostate surgery for benign prostate hyperplasia.

Study Design: Quasi-experimental study.

Place and Duration of Study: Department of Anesthesia, Combined Military Hospital, Lahore Pakistan, from Oct 2019 to Apr 2020.

Methodology: A total of 80 patients were divided into two groups. Group-A (n=40) was dealt with spinal anesthesia and Group-B (n=40) with saddle anesthesia. MAP and HR were measured at 0 and 5 minutes after anesthesia and change was noted. Hyperbaric bupivacaine 0.75% was administered at level of L3 and L4 spinal levels. Midline approach was used under aseptic conditions.

Results: The mean age of patients in spinal block Group-A was 56.40±12.01 years and in saddle block Group-B was 62.35±10.96 years. The mean change in MAP of spinal Group-A was 30.45±14.32mmHg and in saddle Group-B was 12.23±7.00mmHg. The mean HR in spinal Group-A was 66.35±4.91/min and in saddle Group-B was 74.88±5.17/min (p<0.05).

Conclusion: There was significantly more change of hemodynamics with spinal block than to saddle block undergoing elective Trans-urethral resection of prostate.

Keywords: Benign prostate, Hyperplasia, Saddle, Spinal, Transurethral.

How to Cite This Article: *Afsar MI, Shahzad S, Tariq M. Change in Hemodynamics with Saddle versus Spinal Block in Patients Undergoing Elective Transurethral Resection of Prostate for Benign Prostate Hyperplasia. Pak Armed Forces Med J 2023; 73(Suppl-1): S266-269. DOI: https://doi.org/10.51253/pafmj.v73iSUPPL-1.5038.*

INTRODUCTION

There are a few techniques of anesthesia which can be used to carry out trans-urethral resection of prostate. These include Subarachnoid, epidural, and caudal neuraxial blocks .These techniques result in sympathetic block, sensory analgesia, and motor block, depending on dose, concentration and volume of local anesthetic after insertion of a needle in the plane of the neuraxis.[1] The purpose of this study to check the reliability and ease of doing Trans-urethral resections under saddle block anesthesia which gives more hemodynamic stability as compared to spinal anesthesia.

Continuous spinal anesthesia is another very reliable and versatile technique for providing effective anesthesia and analgesia, especially in elderly and patients with cardiac issues.[2] Although increasingly being treated medically, some men require surgical intervention. Transurethral resection of the prostate (TURP) is the most common surgical procedure performed for bladder outlet obstruction due to BPH.[3]

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Received: 18 Aug 2020 revision received: 06 Jun 2022; accepted: 30 Aug 2020

At present the gold standard technique for treatment of benign prostatic hyperplasia is trans-urethral resection of prostate.[4] TURP surgery can be done under either saddle or spinal block of regional anesthesia. Surgery is performed in lithotomy position. TURP patients are particularly vulnerable to volume overload as most of them belong to elderly age group and have cardiopulmonary disorder. Subarachnoid block helps in peripheral pooling of blood, reducing the chance of circulatory overload and early detection of complications. Other advantages of subarachnoid technique include post-operative analgesia, reduction in blood loss during surgery & deep vein thrombosis.[5]

The major problem of subarachnoid block is risk of hypotension due to sympathetic blockade. The vasodilatation leads to diminished venous return which is the main contributory factor for hypotension. This hypotension is usually corrected by either administration of intravenous fluids or a vasopressor. But liberal use of intravenous fluid administration is dangerous particularly in elderly patients with compromised cardiopulmonary function.[6] Saddle block paralyzes pelvic muscles and sacral nerve roots. Due to lower level of sympathetic block, hemodynamic

derangement and fluid requirement is less. So, there is minimum chance of hemodynamic instability and also provides good surgical field.[7]

BPH, also called benign enlargement of the prostate, is a noncancerous increase in size of the prostate. Main symptoms of benign prostatic hyperplasia include urgency, intermittently decreasing stream and nocturia which are also called as lower urinary tract symptoms.[8] Benign prostatic hyperplasia affects 50 % of men above the age of 60 years.[9] Benign prostatic hyperplasia involves hyperplasia of prostatic stromal and epithelial cells, resulting in the formation of large, fairly discrete nodules in the transition zone of the prostate. During transurethral resection of prostate both intravascular and extravascular irrigating fluids are absorbed which may lead to cardiac discomfort.[10]

METHODOLOGY

The quasi-experimental study was carried out at Department of Anesthesia, Combined Military Hospital, Lahore Pakistan, from October 2019 to April 2020. Sample size of eighty cases was calculated using WHO calculator; Forty cases in each group with 95% confidence level and power of test 90%, taking magnitude of mean change in MAP i.e., 16.46±2.66mmHg with spinal block and 8.90±1.56mmHg with saddle block in undergoing elective TURP surgery. Sampling technique was non-probability consecutive sampling.

Inclusion Criteria: Male patients aged forty to eighty years diagnosed with BPH (history of difficulty in voiding urine and ultrasound showed positive size >30 units and Prostate specific antigen level <10mg/dl were planned to undergo TURP under the regional aesthesia, were inlcudedin the study.

Exclusion Criteria: Patients having ASA IV, congenital anomaly or deformity of the spine, contraindications to spinal anesthesia e.g. local sepsis, coagulopathy, severe hypovolemia, increased intracranial pressure, severe aortic stenosis and severe mitral stenosis were excluded.

Eighty patients fulfilling selection criteria were enrolled in the study through ward of Urology Departtment, Combined Military Hospital Lahore. An informed written consent was obtained. In the operating room intravenous access was placed with 18-gauge cannula and patients were preloaded with ringer lactate at a rate of 5ml/kg. Standard monitors were attached to record HR and MAP. Patients were randomly divided in two groups by using the lottery method. Patients assigned to Group-A were administered spinal block, 2ml of 0.75%(15mg) hyperbaric bupivacaine with 25-gauge Quincke needle at L3-L4 inter-vertebral space via midline approach in sitting position after ensuring free flow of cerebrospinal fluid. Patients placed supine immediately after administration of the drug in the subarachnoid space, with one pillow under the head. Patients assigned to Group-B were administered saddle block, 2ml of 0.75%(15 mg) hyperbaric bupivacaine with 25-gauge Quincke needle at L3-L4 inter-vertebral space via midline approach in sitting position after ensuring free flow of cerebrospinal fluid. Patients were kept in sitting position for five minutes and then placed supine with one pillow under the head.

MAP and HR were measured at 0 and 5 minutes after anesthesia and change was noted. MAP was measured as changes from baseline and after 5 minutes of anesthesia through cardiac monitor. Heart rate was measured as hemodynamic changes are in HR (beats per minute) from baseline and after 5 minutes of anesthesia, recorded through cardiac monitor.

All data was entered and analyzed in SPSS version 21.0. Mean and SD was calculated for quantitative data i.e., age, BMI, change in MAP and HR. Frequency and percentage was calculated for qualitative variables ASA. For comparison of mean change in hemodynamic in both groups, independent sample t-test was applied. *p*-value ≤0.05 was taken as significant.

RESULTS

The mean age of patients in spinal block Group-A was 56.40±12.01 years and in saddle block Group-B was 62.35±10.96 years (Table-I).

Table-I: Demographics of Patients (n=80)

	Study Groups	
	Spinal Block-A	Saddle Block-B
n	40	40
Age (years)	56.40±12.01	62.35±10.96
BMI	23.044±3.24	24.031±3.34
ASA		
I	14	17
II	26	23

Table-II: Comparison of Hemodynamics in both Groups (n=80)

Hemodynamics	Spinal Block	Saddle Block	*p*-value
MAP at baseline	129.83±12.596	120.30±8.87	0.001
MAP at 5 minutes	99.38±5.664	108.07±8.508	0.001
Change in MAP	30.45±14.315	12.23±7.00	0.001
HR at baseline	85.03±6.141	84.90±6.332	0.001
HR at 5 minutes	66.35±4.192	74.88±5.165	0.001
Change in HR	18.68±8.078	10.03±3.017	0.001

The mean change in MAP of spinal Group-A was 30.45±14.32mmHg and in saddle Group-B was 12.23±7.00 mmHg. The mean HR in spinal Group-A was 66.35±4.91 /min and in saddle Group-B was 74.88±5.17/min (p<0.05). There was significantly more change of hemodynamics with spinal block than to saddle block undergoing elective Trans-urethral resection of prostate (Table-II).

DISCUSSION

TURP is the most common surgical intervention for patients with BPH.[11] It can be carried out under different techniques of anesthesia. One of them is Spinal anesthesia. Spinal Anesthesia offers the advantage of an awake patient which can help in identification of TURP syndrome.[12] However spinal anesthesia causes hypotension.[13] Saddle block paralyzes pelvic muscles and sacral nerve roots but causes less hemodynamic derangement.

Rationale of this study is to compare the mean change in hemodynamics with saddle block versus spinal block in patients undergoing elective TURP for BPH. As spinal block is commonly used in my hospital for TURP, but it causes more decrease in hemodynamics of a patient as compared to saddle block, as shown in literature above. No local evidence is available in this regard. We want to conduct this study so that in future, we may be able to implement the results of this study in local population. This will help to improve our practice and update local guidelines. The prevalence increases after age of 40 years.[14] The prostate gets larger in most men as they get older. For a symptom-free man of 46 years, the risk of developing BPH over the next 30 years is 45%. Incidence rates increase from 3 cases per 1000 man-years at age 45–49 years, to 38 cases per 1000 man-years by the age of 75–79 years. While the prevalence rate is 2.7% for men aged 45–49, it increases to 24% by the age of 80 years.

Benign prostatic hyperplasia is a histological diagnosis.[15] Pathogenesis of benign prostatic hyperplasia and Lower Urinary Tract Symptoms is largely unknown.[16] However, chronic inflammation is associated with severity and progression of the disease.[17] BPH occurs when both epithelial and stromal cells proliferate due to the action of sex hormones and inflammation.[18] When sufficiently large, the nodules push on and narrow the urethra resulting in an increased resistance to flow of urine from the bladder. This is commonly referred to as "obstruction", although the urethral lumen is no less patent. Studies suggest that increase in lower urinary tract symptoms with age is not related to gender.[19]

From urodynamic point of view it is long understood that Lower urinary tract symptoms are clinically due to benign prostatic hyperplasia.[20] Resistance to urine flow requires the bladder to work harder during voiding, possibly leading to progressive hypertrophy, instability, or weakness (atony) of the bladder muscle. If BPH causes obstruction of the bladder and remains untreated, complications such as recurrent urinary tract infections, bladder stones, and chronic kidney disease (potentially leading to kidney failure) may ensue. Surgery is recommended for those patients who have developed complications due to benign prostatic hyperplasia like recurrent urinary tract infections and urinary retention.[21] Lower urinary tract symptoms (LUTS) can also affect mental health.[22] In our study the mean value of change in MAP of spinal group A patients was 30.45±14.315 mmHg and its mean value in saddle Group-B patients was 12.23±7.00 mmHg. Statistically spinal block Group-A showed significantly more change in MAP than to saddle block Group-B. i. e p-value=0.001. Similarly mean value of change in HR of spinal Group-A patients was 18.68±8.078 per minute and its mean value in saddle Group-B patients was 10.03±3.017 per minute. Some of the studies are discussed below showing the results in favour of our study and one is with contrary results.

A study by Susmita Bhattacharyya *et al*.[23] presented that the baseline SBP, DBP, MAP, HR, SpO^2 were comparable between the two groups. 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. 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). They found the hemodynamic changes were more in in the spinal group (Group-A) than the saddle group (Group-B).

One study by Deepika Tiwari *et al*. 24 presented that adequate surgical condition was achieved in both groups. Incidence of hypotension and vasopressor requirement was significantly less in Group-B (Spinal block) than Group-A (Saddle block) (p <0.001). No complication was noted in both groups. Another study conducted by Tiwari *et al.* the mean change in MAP with spinal block was 16.46±2.66mmHg and with saddle block was 8.90±1.56mmHg respectively (p<0.0001). Mean change in HR was more with spinal block (9.20±2.05bpm) than with saddle block (6.26±2.09bpm) (p<0.0001).

Jindal *et al*.10 also noted that fall in heart rate was more following spinal anesthesia than epidural and general anesthesia (21%, 17% and 14% respectively). On the other hand a study by Özmen *et al*.[25] concluded that Saddle block has some advantages compared to spinal and epidural anesthesia methods such as achieving adequate anesthesia, stable hemodynamic, the lower degree of motor blockage and no full blockage in patients. Saddle block is the most optimal anesthesia method for TURP operation.

CONCLUSION

According to our study results there is significantly more mean change of hemodynamics was observed in spinal block group patients than to saddle block group patients undergoing elective transurethral resection of prostate surgery for benign prostate hyperplasia.

Conflict of Interest: None

Author's Contribution

Following authors have made substantial contributions to the manuscript as under:

MIA: Data acquisition, data analysis, drafting the manuscript, critical review, approval of the final version to be published.

SS: Study design, data interpretation, critical review, approval of the final version to be published.

MT: Concept, data acquisition, drafting the manu-script, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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