

## COMPARISON OF BUPIVACAINE AND BUPIVACAINE WITH FENTANYL IN INTRATHECAL BLOCKS FOR CYSTOSCOPIC UROLOGICAL PROCEDURES

Manish Gupta<sup>1</sup>, RK Singhal<sup>2</sup>, Pavan Banga<sup>3</sup>, Amit Rai<sup>4</sup>

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Corresponding Author:

**Dr. Amit Rai,**  
Email: drraiamit@gmail.com  
ORCID: 0000-0002-6077-9402

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<sup>1</sup>HOD, Department of Anaesthesiology and Critical Care, Jaalan BBAli Hospital, South Sharqiyah, Ministry of Health, Sultanate of Oman

<sup>2</sup>Associate Professor and Head, Department of Anaesthesiology and critical care, Command Hospital, Chandimandir, Haryana, India

<sup>3</sup>Professor and Head, Department of Surgery, Varun Arjun medical College and Rohilkhand hospital, Banthra, Shahjanpur, Uttar Pradesh, India.

<sup>4</sup>Professor, Department of Anaesthesiology, Command Hospital, Chandimandir, Haryana, India

### Abstract

**Background:** To compare Bupivacaine and Bupivacaine with Fentanyl in intrathecal blocks for Cystoscopic Urological Procedures. **Materials and Methods:** Forty patients were studied and divided into two groups with equal number of pts in each group. Group -I received 10 mg Bupivacaine heavy and Group-II received 5mg Bupivacaine heavy plus 25 mcg of Fentanyl. The operative procedures were similar in both gps. The onset of analgesia was tested for every pt by loss of cold sensation on dabbing with an alcohol swab. The onset of motor block was noted from time of injection of the drugs until the ability to move the lower limb was lost. **Result:** There were statistical differences between groups in the motor block (0.001). The “T” table value; therefore the difference between them is significant at 5% level of significance. A complete motor block (altogether 10 myotomes blocked, from L2 to S1 at each side) was found in 16 of 20 patients in Group –I whereas 6 of 20 in Group-II. The sensory block assessments are summarized in figure 2. The median of the upper limit of the sensory block was greater than T8 in all groups at the 30 min resting time. The mean duration of sensory block in group I was 199.5 min and in Gp II 208 min; no significant difference found at 5% level of significance. **Conclusion:** The motor blockade in Gp-II was of less duration. In entire duration of surgery, sensory loss exceeded motor paralysis, more in Gp-II, as compared to Gp-I. There were no serious intraoperative and postop complications.

## INTRODUCTION

Spinal anaesthesia for cystoscopic urological procedures, is widely accepted and the preferred mode of anaesthesia for patients. Its efficacy and safety have been well established in various studies. Use of only Bupivacaine heavy as the drug of choice is the standard as it produces a satisfactory motor and sensory block. However in cystoscopic urological procedures a prolonged motor block is not a necessity but a sustained sensory block is more desirable. In this study we have used Inj Fentanyl, a short acting opioid as an additive with Inj Bupivacaine with an attempt to reduce the dosage of Inj Bupivacaine so that the procedures can be performed satisfactorily even with reduced intensity and duration of motor block but equal or more sustained sensory block. It would enable earlier recovery and mobilization of the patient.

Some investigators have examined small doses of spinal bupivacaine to be used in surgical procedures lasting less than an hour (Genetilli M, Senlis H et al 1997 Kuusniemi K, et al 1997).<sup>[1,2]</sup> Lipophilic opioids (eg, fentanyl and sufentanyl) are increasingly being administered intrathecally as adjuncts to local anaesthetics. They enhance spinal anaesthesia without prolonged motor recovery and discharge time. This study intends to do Comparison of Bupivacaine and Bupivacaine with Fentanyl in intrathecal blocks for Cystoscopic Urological Procedures.<sup>[1]</sup>

## MATERIALS AND METHODS

Forty ASA physical status I-III patients, schedule for cystoscopic procedures, TURP, removal of Bladder tumours, or other urologic procedures. The

patients are randomly allocated into two study groups, which are as follows.

**Group-I:-** (n=20) → Bupivacaine 10 mg

**Group-II:** (n=20) Bupivacaine 5.0 mg + Fentanyl 25 microgram (All solutions would be prepared using Bupivacaine 5 mg/ml and fentanyl 50 mcg/ml) 0.5 ml of distilled water added to Fentanyl in gp II to make it equivolume.

### Inclusion Criteria

1. Adults 20 yrs of age and above
2. ASA physical status I,II and III
3. Schedule for elective urological procedures.

### Exclusion Criteria

1. Patient with deformities of the spine.
2. Mentally disturbed patients.
3. Patients with neurological disease.
4. History of allergic reactions to local Anesthetics.
5. Bleeding Diathesis.

### Preoperative Investigations

1. Hb
2. TLC
3. DLC
4. Urine RE
5. Others

### General & Systemic examination.

#### Spinal Analgesia

1. Position
2. Drug
3. Intervertebral Space
4. Dosage
5. Time of Injection

### Assessment

#### Assess sensory block by using alcohol swab for cold sensation.

Adverse Effects	Group-I (n=20)	Group-II (n=20)
None		
Shivering		
Pruritus		
Vomiting		
Nausea		
Respiratory Depression		
Post dural Puncture headache		
Transient Neurological Symptoms		
Hypotension		
Bradycardia		

### Methods

Forty ASA physical statuses I-III patients, scheduled for cystoscopic procedures, removal of bladder tumors, or other urologic procedures, were studied in a double blinded randomized prospective manner. Patients with deformities of the spinal column, mental disturbance, or neurological disease were excluded from the study. The ethics committee approval was taken and written informed consent

was obtained from all patients. The study groups according to the anaesthetic solution used were as follows: Group-I (n=20), bupivacaine 10 mg; Group-II (n=20) bupivacaine 5.0 mg with 25 mcg fentanyl. All solutions were prepared by using bupivacaine 5 mg/ml and fentanyl 50 mcg/ml. Final volume was adjusted to 2.0 mL

All patient were premedicated 1-1.5 h before surgery with Diazepam 5-10mg orally depending on the patient's age and weight. Drug therapy for concomitant medical problems was continued as deemed appropriate by the anaesthesiologist. 0.9% NS drip was started.

The same anaesthesiologist performed all the blocks.

An anaesthesia nurse prepared the solutions so that the anaesthesiologist performing the block was unaware of which drug combination was injected.

Spinal anaesthesia was performed at the L-2 interspace with the patient in sitting position by using a 26-gauge whitacre unidirectional needle. Free flow of cerebrospinal fluid was verified before injection of the anesthetic solution was administered, without barbitage or aspiration at the end of injection.

Direction of the needle aperture was cranial during the injection. All patients were then placed in the lithotomy or supine position for the operation.

Patients were monitored with electrocardiography, automated oscillotometry, and pulse oximetry. Hypotension (systolic arterial pressure <90 mm) was treated with 3 mg increments of mephentermine IV. Bradycardia (heart rate <50 bpm or decreased more than 20% from the initial value) was treated with IV atropine 0.5 mg.

Respiratory depression was defined as a respiratory rate <10 breaths/min and/or oxygen saturation of <85% in room air, other adverse effects, including pruritus, nausea, and vomiting were recorded. In the majority of cases a urinary catheter was inserted after the procedure.

The level of sensory block, defined as the loss of cold sensation by using an alcohol swab test, was recorded bilaterally at the mid clavicular line. Motor block in the lower limbs was assessed with reference to specific myotomes. It was done by testing the power of a specific joint movement of both lower limbs that were graded as equivalent to the following five myotomes: L2 hip flexion, L3 Knee extension, L4 ankle dorsiflexion, L5 great toe dorsiflexion, S1 ankle plantar flexion. Complete motor block or absent power at a myotome and intensity of motor block was recorded as myotome score, which was the number of myotomes blocked from 0 to maximal 10. Total score was sum of score of 5 points for each side, 10 points total.

Measurement of respiratory rate, testing of cold analgesia and motor block were performed at 10, 20, and 30 min, at the end of operation, 2h from the injection, and thereafter at 30 min intervals until the motor block had completely receded.

Patients were discharged from the recovery room when after resolution of motor block was complete. The discharge criteria for the ward were stable vital signs, minimal nausea or vomiting, no severe pain or bleeding after operation. Patients were interviewed regarding anaesthetic procedure.

In addition to testing the sensory block by alcohol swab for cold sensation, the patients were asked to report to the investigator when they had normal sensation in the buttocks and feet (subjective feeling of total recovery).

Patients were interviewed again regarding their opinion of the anesthetic procedure, headache or backache and whether they would have the same anesthesia next time for a similar operation.

Headache was classified as postdural puncture headache (PDPH) if it was aggravated by erect and sitting position, relieved on lying flat, mainly occipital or frontal and increased on coughing/sneezing or straining. Transient neurological symptoms (TNS) were defined as pain and/or dysaesthesia in the back, buttocks, and legs or pain radiating to the lower extremities after initial recovery from spinal anesthesia and resolved within 72 h.

Statistical analysis was conducted using unpaired t test assuming unequal variances.

## RESULTS

Patients' demographic data and duration of surgery are listed in [Table 1]. The two groups were comparable with respect to age, height and weight. The motor block assessments are presented in [Figure 1]. The group-II, in which the dose of bupivacaine was the smallest (5 mg), there was no motor block in some of the patients at the end of the operation, yet none of the patients needed supplementation of analgesia during the operation and the surgeons were satisfied with the intensity of the motor block.

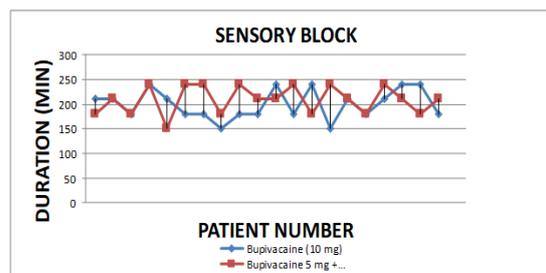


Figure 1

Outcome of the study is quantitatively measured. Sample size is small (40), therefore comparison of two mean variables in both motor and sensory block is done by using unpaired t test assuming unequal variances.

There were statistical differences between groups in the motor block (0.001). the "T" table value; therefore the difference between them is significant at 5% level of significance.

A complete motor block (altogether 10 myotomes blocked, from L2 to S1 at each side) was found in 16 of 20 patients in Group –I whereas 6 of 20 in Group-II.

The sensory block assessments are summarized in figure 1. The median of the upper limit of the sensory block was greater than T8 in all groups at the 30 min resting time. The mean duration of sensory block in group I was 199.5 min and in group II 208 min; no significant difference found at 5% level of significance.

Two patients in group-I and four patients in Group-II had hypotensive episode. On each occasion, the blood pressure returned to normal after one increments of IV mephentermine 3 mg and infusion of 500 ml of NaCl 0.9%. Three patients needed treatment for bradycardia. In all patients who received fentanyl, pruritus was the most common complication. There were no spontaneous reports of pruritus. 32 patients (40%) required analgesics post operatively with the first 24 Hrs. PDPH or TNS were not documented in any patient [Table 2].

When interviewed on the third post operative day, 97.5% of the patients rated the anaesthesia method as good, and 100% would choose this anaesthesia in the future for a similar operation.

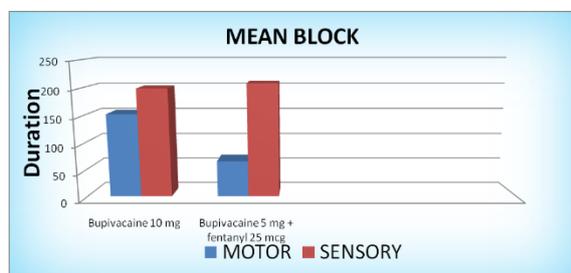
Table 1: Demography Data and Duration of surgery

	Group-I	Group-II
NO	20	20
Age (Yrs)	50 +/- 20	55 +/- 30
Weight (Kg)	70 +/-15	65 +/- 10
Height (cm)	170 +/- 7	172 +/- 8
Surgery Time (min)	50 +/-30	30 +/- 15
Bupivacaine (mg)	10.0	5.0
Fentanyl (mcg)	-	25

SRNO	MOTOR		SENSORY	
	Bupivacaine (10 mg)	Bupivacaine 5 mg + Fentanyl 25 mcg	Bupivacaine (10 mg)	Bupivacaine 5 mg + Fentanyl 25 mcg
1	150	30	210	180
2	180	60	210	210
3	150	60	180	180
4	210	120	240	240
5	150	30	210	150
6	120	120	180	240
7	120	120	180	240
8	90	30	150	180
9	150	60	180	240
10	120	60	180	210
11	180	30	240	210
12	120	120	180	240
13	240	60	240	180
14	120	60	150	240
15	180	60	210	210
16	120	30	180	180
17	150	120	210	240
18	180	60	240	210
19	210	30	240	180
20	120	60	180	210
	Bupivacaine (10 mg)	Bupivacaine 5 mg + Fentanyl 25 mcg	Bupivacaine (10 mg)	Bupivacaine 5 mg + Fentanyl 25 mcg
Time	153	66	199.5	208.5

**Table 2: Adverse effect**

Adverse Effect	Group-I (n=20)	Group-II (n=20)
None	13(65)	11(55)
Shivering	4(20)	1(5)
Pruritus	-	7(35)
Vomiting	-	-
Nausea	-	-
Respiratory depression	-	-
PDPH	-	-
TNS	-	-
Hypotension	4(20)	1(5)
Bradycardia	1(5)	-



**Figure 2**

## DISCUSSION

The various parameters were assessed and analyzed during the study.

The quality of motor block was assessed as per the myotonic score in both the groups. In Group-I score was 10 (from L2 to S1 at each side) in 16 of 20 patients and 12 of 20 patients in Group-II.

The median of the upper limit of the sensory block was greater than T7 in both the groups, just as the operation began.

Motor block was assessed every 10 min up to 30 min from the time of injection. Thereafter it was assessed every 30 min until complete resolution of motor block. The mean duration in group –I was 153 min and in Group-II was 66 min. Difference in

duration in motor block was statistically significant (<0.05) by applying unpaired “T” test assuming unequal variances.

Sensory block was assessed by dabbing with alcohol swab for cold sensation method at every 10 min interval upto 30 min, thereafter it was assessed at 30 min interval. The mean duration of sensory block in Group-I was 199.5 min and in Group-II it was 208.5 min. Differences in duration of block was statistically not significant (>0.05) by applying unpaired “T” test assuming unequal variances.

### Peri Operative Complication

In Group-I, 4pts/20 had hypotensive episodes, whereas in Group-II only 1 pt had a hypotensive episode. The pressure returned to normal in either after one increment of 3 mg Injection mephentermine IV and / or infusion of 500ml 0.9%Normal saline solution.

**Bradycardia-** 3 pts out of 20 had bradycardia in Group-I and none in Group-II.

**Respiratory Depression-** None cases reported in either group.

There was no complaint of TNS and PDPH in both Groups.

Pruritus- was the most common side effect in group-II (7/20). None required any specific treatment as it was mild and resolved by itself.

**Nausea and vomiting-** None of the pts in either Group had any such complaints.

**Shivering-** was seen in 04 pts out of 20 in group-I and 01 pt in Group-II.

This study suggests that addition of 25 mcg of Fentanyl to, 5 mg of Bupivacaine intrathecally for urological procedures results in short-acting motor block but the same level of sensory analgesia as the dose of 10mg of Bupivacaine without Fentanyl. The median level of the upper limit of sensory block reached T7 in both Groups.

The patients in Group-II could have been discharged home on the day of surgery according to discharged criteria. On follow up 97.5% of pts would choose this anaesthesia in the future for a similar operation. Several investigators have evaluated intrathecal fentanyl with smaller doses of Spinal local anaesthetics. Liu et al,<sup>[3]</sup> (1995) found that Fentanyl 20mcg in combination with spinal Lidocaine (50 mg) prolonged sensory anaesthesia without prolonging recovery of motor function. Sensory block was prolonged in both thoracic and lumbar dermatomes with the addition of Fentanyl. Furthermore, Ben David et al,<sup>[4]</sup> found that a small dose of Fentanyl (10 mcg) added to spinal anaesthesia with a small dose of dilute Bupivacaine (5mg) in ambulatory pts undergoing knee arthroscopies intensified and increased the sensory blockade without increasing the intensity of motor block or prolonging recovery of micturation or full recovery.

We added fentanyl to bupivacaine to determine its effect on anaesthesia quality, motor block and sensory block.

When large doses of local anaesthetic are used, the sensory and motor blocks develop rapidly as a result of an over dosage in relation to the minimum concentration required to block the various nerve fiber types. Even though the motor block was not complete with 5 mg of bupivacaine and fentanyl addition, the surgeons did not request more intense motor blocks.

It can be assumed that the recovery and mobilization of the patient could be faster if the motor block was less intense.

Pruritus is a common complication when intrathecal opioids are used (Hamber EA, Viscomi CM 5 1999, Liu et al 1995),<sup>[3]</sup> found that the addition of 20 mcg of fentanyl intrathecally led to pruritus in all patients. In the current study, pruritus occurred in 22.5% of all patients.

The administration of intrathecal opioids may provide benefits in augmenting intra operative

anaesthesia, but carries a risk of respiratory depression (Etches R, et al 1989).<sup>[6]</sup> Fentanyl is much more lipid soluble than morphine and hence does not tend to migrate intrathecally to the fourth ventricle in sufficient concentration to cause respiratory depression. Varassi et al 1992),<sup>[7]</sup> demonstrated that the subarchanoid administration of 25 mcg of fentanyl during spinal anaesthesia in non-premedicated elderly men did not alter respiratory rate and tidal tension of CO<sub>2</sub>, minute ventilation, respiratory drive, respiratory timing or the ventilatory response to CO<sub>2</sub>. On the contrary 50 mcg of subarchanoid fentanyl caused an early respiratory depression in elderly patients.

In conclusion, the addition of fentanyl 25 mcg to bupivacaine 5 mg resulted in short-lasting motor block but the same level of sensory analgesia as larger doses of bupivacaine (10 mg) without fentanyl. It also resulted in lesser periop complications.

## CONCLUSION

The level of analgesia between the groups was comparable. The motor blockade in Gp-II was of less duration. In entire duration of surgery, sensory loss was equivalent or exceeded motor paralysis, in Gp-II, as compared to Gp-I. There were no serious intraoperative and postop complications. Pruritis was the only noticeable side effect in Gp-II pts, (22.5%) Postop analgesia was longer in Gp-II pts, even though lesser dose of Bupivacaine was used. There was no case of respiratory depression.

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