

# Unilateral spinal anaesthesia: An alternative and effective approach in infra-umbilical surgeries in geriatric population

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## Abstract

**Background:** Spinal anaesthesia is simple, easy to administered and reliable cost-effective technique that has been widely used for infra-umbilical surgery. For day care surgical treatment of infra-umbilical origin on one, unilateral spinal block procedure is thought to have more advantages over conventional spinal anaesthesia in producing extreme longer lasting block in the operative limb, the lower incidence of hypotension and maintenance of cardiovascular stability. Unilateral anaesthesia is a specific regional anaesthesiology technique. It was first described by Tanasichuk *et al.* in 1961 as 'spinal hemianalgesia'. **Materials and Methodology:** Source of Data Patients scheduled for infra-umbilical surgery in, Rural Hospital, Chiplun, was selected for the study over a period of one year from December 2016 to December 2017. Type of Study Prospective randomised observational study. Selection of Patient Convenience type of non-probability sampling was used for selection of study subjects. A total of 208 patients posted for infra-umbilical surgeries in Rural Hospital, Chiplun, were included in the study. **Result:** Results were formulated based on demographic data, characteristic of block, heart rate, systolic blood pressure and diastolic blood pressure changes. **Conclusion:** Considering the problems related to geriatric age group they are more prone to cardiovascular instability following spinal anaesthesia and they cannot tolerate it due to poor compliance. Unilateral spinal anaesthesia with Bupivacaine 5 mg was better in terms of hemodynamic stability as compared to Bilateral spinal anaesthesia with Bupivacaine 7.5 mg. **Key Word:** Unilateral spinal anaesthesia.

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## INTRODUCTION

Spinal anaesthesia is simple, easy to administered and reliable cost effective technique that has been widely used for infra-umbilical surgery. For day care surgical treatment of infra-umbilical origin on one, unilateral spinal block procedure is thought to have more

advantages over conventional spinal anaesthesia in producing extreme longer lasting block in the operative limb, the lower incidence of hypotension and maintenance of cardiovascular stability, in addition to providing a stronger block on the side of surgery and accelerating the recovery of the nerve block reduction of hypotension, faster recovery and increased patient satisfaction.<sup>1-7</sup> Unilateral anaesthesia is a specific regional anaesthesiology technique. It was first described by Tanasichuk *et al.* in 1961 as 'spinal hemianalgesia' in patients who were to undergo infra-umbilical surgery on one side. The basic objective of unilateral spinal anaesthesia is to limit the nerve block exclusively to the area of the surgery and for the duration of the operation<sup>8,9</sup>. Therefore, it is also often recommended for use in short-term surgical interventions that involve only one side of the body.

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## MATERIALS AND METHODOLOGY

**Source of Data:** Patients scheduled for infra-umbilical surgery in, Rural Hospital, Chiplun, was selected for the study over a period of one year from December 2016 to December 2017.

**Type of Study:** Prospective randomised observational study.

**Selection of Patient:** Convenience type of non-probability sampling was used for selection of study subjects. A total of 208 patients posted for infra-umbilical surgeries in Rural Hospital, Chiplun, were included in the study.

## SELECTION OF CASES

### Inclusion criteria

- Age of patient: Above 60-85 yrs.
- American society of anaesthesiologists (ASA) physical status I–II
- Patient undergoing infra-umbilical surgeries

### Exclusion criteria

- Patient refusal for the procedure.
- Allergic to amide local anaesthetic.
- All general contraindication for spinal anaesthesia.

**Anaesthesia technique:** After written informed consent, a randomized prospective observational clinical study was carried out on 208 patients of American Society of Anaesthesiologist (ASA) Grade I, II or III, of either sex, age between 60–85 years, undergoing various infra-umbilical surgeries. The study was conducted in two groups of 104 patients each. The patients were randomly assigned in 2 groups by the sealed envelope method:

**Group U:** Unilateral spinal anaesthesia with Bupivacaine 0.5 % (H) 5 mg.

**Group B:** Bilateral spinal anaesthesia Bupivacaine 0.5 % (H) 7.5 mg.

Pre-anaesthetic evaluation was performed on the day before surgery. The procedure of block along with possible complications was explained to the patients, and written informed consent was obtained. All patients were given oral Alprazolam 0.5 mg and inj. Ranitidine 150 mg on the night before the surgery, and were fasting overnight. On arrival in the operation room, baseline heart rate, blood pressure and oxygen saturation were recorded. An intravenous line was secured with 18G iv cannula in the unaffected limb and Ringer's lactate was started. Patients were taken to the O.T. and pulse rate, blood pressure, ECG, SpO<sub>2</sub>, respiratory rate, temperature were noted

**In unilateral spinal anaesthesia:** patients were placed in lateral decubitus position with the limb to be operated on in the dependent position. The vertebral column position was accurately visualized before dural puncture and was

maintained as horizontal as possible by tilting the operating table or by putting a pillow under the shoulder. Dural puncture was performed at L3-4 interspace using 25-gauge Quincke's spinal needle with the midline approach and the needle hole was turned toward the dependent side. To ensure good needle placement gentle barbotage of 0.1 ml was used. Drug was injected after checking of free flow of CSF and according to group selected. The drug was injected over 2 minutes slowly. The lateral decubitus position was maintained for 15 minutes from the beginning of the injection. Immediately after completion of block, patients were placed in supine position until adequate sensory and motor blockade achieved for surgery.

**In bilateral spinal anaesthesia:** patients were placed in sitting position. A standard subarachnoid block was performed in L3-L4 Space in sitting position with 25 G spinal needle (Quincke's type) under all aseptic precautions. The drug was injected after checking of free flow of CSF and according to group selected. Immediately after completion of block, patients were placed in supine position until adequate sensory and motor blockade achieved for surgery. Thereafter, all the patients were positioned accordingly and the surgery was started.

## Criteria Of Block

**Onset of sensory block:** The sensory block was evaluated by pinprick method using 22-G hypodermic needle. Sensory block was assessed at 1 min intervals until block reaches T10, and then repeated every 2 minutes until the level stabilizes for four consecutive tests. This level was recorded as the peak sensory block level. Onset of adequate sensory block was defined as the achievement of a sensory block level of T10 dermatome or higher which is required to initiate the surgery. After the surgery, sensory block level was evaluated every 30 min in recovery room until its regression to L5 level.

### Onset of motor block:

Motor block was assessed by using the modified Bromage Scale. It was recorded every 5 minutes until the surgery was started. After surgery, total duration of motor blockage was noted.

### Modified bromage scale

**Grade-0:** No block – full flexion of knee and feet.

**Grade-I:** Partial block - just able to flex knee but full flexion on feet.

**Grade-II:** Almost complete block – unable to flex knee but complete flexion of feet possible.

**Grade-III:** Complete block: Unable to flex knee and feet. Patients with VAS score  $\geq 3$  received diclofenac 75 mg intramuscularly for rescue analgesia. The VAS score of  $>3$  constituted the end point of the study. The following

complications were noted **1-Hypotension, 2-Hypoxia, 3-Bradycardia, 4-Nausea/ vomiting, 5-Restlessness, 6-Shivering, 7-Urinary retention, 8-Pruritus, 9-Surgical complications**

**Hemodynamic Changes:** Hemodynamic parameters, sensory and motor blockage were assessed by anaesthesiologist at 0,5,10,15,30,45,60 min following block. Thereafter observation was continued at 30 minute intervals until the motor block regresses completely as defined by modified Bromage score. Postoperatively the parameters were recorded at 30 min intervals until the patient meets the criteria for discharge. IV fluids were administered according to requirement. Criteria for hypotension was considered as BP below 30% of pre-induction value and bradycardia was considered if fall in heart rate was greater than 20% of pre-induction value. Hypotension was treated with intravenous fluids and Inj.

Mephentermine, if necessary. Bradycardia was treated by Inj. Atropine defined as HR < 60/min. The duration of spinal anaesthesia was calculated from the time of spinal injection to the time taken for two level sensory regressions from the peak block height. Time of sensory regression to below L5 level and time to complete motor

**Statistical Analysis:** Results were expressed as means  $\pm$  standard deviation of the means (SD) or number (%). Comparison between different parameters in the two studied groups were performed using unpaired t test. Comparison between categorical data was performed using Chi square test. The data were considered significant if p value was equal to or less than 0.05 and highly significant if p value < 0.01. Statistical analysis was performed with the aid of the SPSS computer program (version 12 windows).

**Table 1: Demographic data**

	Group U	Group B	Statistical significance
Age (yr)	77.76 $\pm$ 8.63	74.63 $\pm$ 7.95	NS
Weight (kgs)	58.63 $\pm$ 5.12	58 $\pm$ 6.67	NS
Sex (M/F)	24/06	22/08	NS
ASA (II /II)	13/17	12/18	NS
Duration of surgery (min)	49.9 $\pm$ 2.95	48.73 $\pm$ 2.77	NS

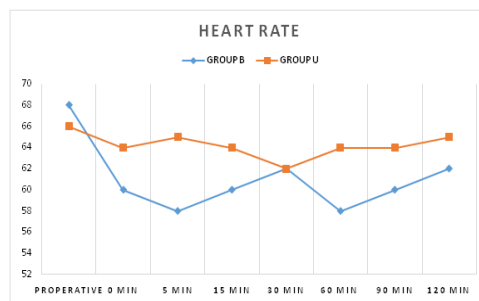
Data were expressed as means  $\pm$  standard deviation. Significant figures of P value Significant (P < 0.05), Highly significant (P < 0.01), Not significant (p > 0.05) There was no statistically significant difference among the two groups as regards Age, sex ASA grade, weight, height, and duration of surgery.

**Table 2: Characteristics of Block**

Parameters	Mean $\pm$ SD		
	Group U	Group B	
Onset of Sensory Block (min)	3.83 $\pm$ 1.01	4.83 $\pm$ 1.5	HS
Onset of Motor Block (min)	6.53 $\pm$ 1.75	7.43 $\pm$ 1.5	HS
Duration of Sensory block (min)	80 $\pm$ 4.33	90 $\pm$ 4.87	HS
Duration of Motor block (min)	70 $\pm$ 3.6	68.3 $\pm$ 4.41	HS
Rescue analgesia (min)	98.67 $\pm$ 6.50	126.21 $\pm$ 7.99	HS

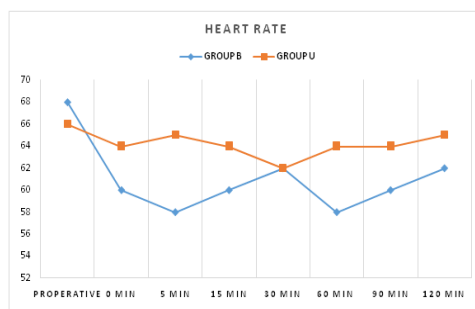
Data were expressed as means  $\pm$  standard deviation. Significant figures of P value Significant (P < 0.05), Highly significant (P < 0.01), Not significant (p > 0.05)

**Hemodynamic changes**



**Figure 3: heart rate**

As we can see from table no:3, fall in heart rate was more in group B as compared to group U.



As we can see from table no:4, systolic blood pressure changes were constant throughout the procedure which shows hemodynamic stability of patients in group U.

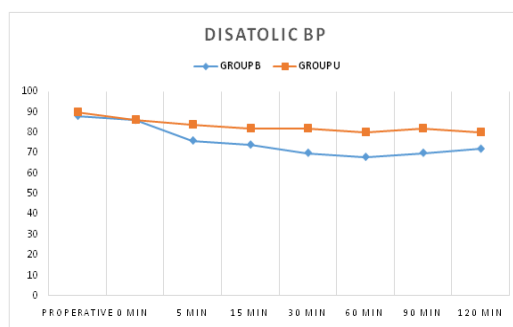


Figure 5: Diastolic Blood Pressure

As we can see from table no:4, diastolic blood pressure changes were constant throughout the procedure which shows hemodynamic stability of patients in group U.

## DISCUSSION

Spinal anaesthesia is simple and reliable cost effective technique that has been widely used for ambulatory anaesthesia especially in infra-umbilical surgery.<sup>7</sup> In our study age group is between 60 -85 years. Although many older adults are quite active and continue to work, they have limited physiological reserve whereas many others have multiple disease processes and are at an increased risk over the general population. This makes it essential to develop a better understanding and an increased expertise in caring for the geriatric surgical patient.<sup>10-13</sup> Considering the problems related to geriatric age group they are more prone to cardiovascular instability following spinal anaesthesia and they cannot tolerate it due to poor compliance.<sup>12</sup> Unilateral spinal anaesthesia is becoming more popular for surgical procedures that are limited to one side of the body in geriatric age group in recent years. For day care surgical treatment of infra-umbilical origin on one, unilateral spinal block procedure is thought to have more advantages over conventional spinal anaesthesia in producing extreme longer lasting block in the operative limb, the lower incidence of hypotension and maintenance of cardiovascular stability, in addition to providing a stronger block on the side of surgery and accelerating the recovery of the nerve block reduction of hypotension, faster recovery and increased

patient satisfaction.<sup>14-18</sup> In our study the demographic data was comparable in both the groups as shown in Table no:1 As we can see from table no:2 Onset of sensory and motor block was earlier in Group B as compared to Group U which was  $3.83 \pm 1.01$ mins in Group B and  $4.83 \pm 1.5$ mins in Group U for sensory block. Group B  $6.53 \pm 1.75$  and Group U  $7.43 \pm 1.5$ mins for motor block. The duration of sensory block was more in Group L as compared to Group B and duration of motor block was less in Group U which helps in early mobilization. In our study as we can see from Table no 3, 4 and 5 showing changes in heart rate, systolic blood pressure and diastolic blood pressure changes respectively in Group B and Group U, we found the fall in heart rate, systolic blood pressure and diastolic blood pressure was less with unilateral spinal anaesthesia. Which shows more hemodynamic stability of unilateral anaesthesia over bilateral anaesthesia. In our study, none of the patients of either group had inadequate analgesia or required general anaesthesia for failed block that are similar to the results by Barghi *et al* and Singh *et al*.<sup>2,4,17</sup> Patients and surgeon's satisfaction during intra operative was also analysed in the present study. Most of the patients felt complete absence of sensation while very few had sensation of motion only. None of the patients in both the groups had inadequate or failed spinal anaesthesia, so as

to require IV supplementary analgesics or general anaesthesia to complete the surgery. None of the surgeons felt difficulty in performing surgery in both groups. Sedation score was similar in both the groups and most of the patients were awake and calm and did not require any intraoperative sedation. This suggests the safety of this technique even in high risk patients. It also has the advantage that it avoids the need for intense monitoring of patient in immediate postoperative period. In our study none of the patient in unilateral spinal group observed hypotension or brady cardia proving efficacy of unilateral spinal block over conventional spinal block in terms of side effects.

## CONCLUSION

Although many older adults are quite active and continue to work, they have limited physiological reserve whereas many others have multiple disease processes and are at an increased risk over the general population. This makes it essential to develop a better understanding and an increased expertise in caring for the geriatric surgical patient. Hence, unilateral spinal anaesthesia with Bupivacaine 5 mg was better in terms of hemodynamic stability as compared to Bilateral spinal anaesthesia with Bupivacaine 7.5 mg. Also, unilateral spinal anaesthesia was recommended for high risk geriatric age group.

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