

**Original article :**

**Analysis of the Hemodynamic Effects of a “Minidose” Bupivacaine–  
Fentanyl Spinal Anesthetic versus a Conventional Dose of Spinal  
Bupivacaine in Elderly Patients Undergoing Surgical Repair of Traumatic  
Hip Fracture: A Comparative Study**

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**Abstract**

**Background:** The term hip fracture is something of a misnomer. It actually refers to a fracture of the upper end of the thigh bone (femur). The present study was undertaken to assess the hemodynamic effects of a “minidose” bupivacaine– fentanyl spinal anesthetic versus a conventional dose of spinal bupivacaine in elderly patients undergoing surgical repair of traumatic hip fracture.

**Materials and Methods:** A total of 100 patients were enrolled in the present study and were broadly divided into two study groups with 50 patients in each group as follows: Group 1: “minidose” bupivacaine– fentanyl spinal anesthesia, and Group 2: Conventional dose of spinal bupivacaine. Complete demographic details of all the patients were recorded. All the surgical procedures were performed under the hands of skilled and experienced orthopedic surgeons. Anesthesia was given to all the patients according to their respective group. Continuous monitoring of the hemodynamic parameters was done in all the patients. All the results were analyzed by SPSS software.

**Results:** No significant results were obtained while comparing the mean arterial pressure among both the study groups at different time intervals. Also, no-significant difference was observed while comparing the mean heart rate at different time intervals in between the two study groups.

**Conclusion:** In elderly patients undergoing surgical repair for hip fractures “minidose” of isobaric bupivacaine in combination with fentanyl delivers completely satisfactory spinal anesthesia.

**Keywords:** Bupivacaine, Fentanyl, Fracture.

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**INTRODUCTION**

The term hip fracture is something of a misnomer. It actually refers to a fracture of the upper end of the thigh bone (femur). The anatomic characteristics of hip fractures are important for three reasons. First, the hip joint and its attached muscles are critical in the ability to stand and to walk. Second, this part of the

skeleton is subject to complex forces and stresses during the activities of daily living. These forces and stresses are very different from those that occur during a fall.<sup>1- 3</sup> The hip, in effect, is designed to withstand the stresses associated with daily living but is poorly designed to withstand the impact from a fall. Third, the location of the fracture, as well as its severity, influences the

choice of therapy (i.e., type of surgery).<sup>4</sup>

Surgical repair is a key element in the management of hip fracture. Before surgery, most patients are confined to bed. In theory, delay in surgery and mobilization could affect functional and other outcomes by increasing bedrest-associated complications, including thromboembolism, urinary tract infections, atelectasis, and pressure ulcers. On the other hand, precipitous surgery and failing to stabilize medical problems could increase the risk of perioperative complications.<sup>7</sup>

Hence; under the light of above mentioned data, the present study was undertaken to assess the hemodynamic effects of a “minidose” bupivacaine– fentanyl spinal anesthetic versus a conventional dose of spinal bupivacaine in elderly patients undergoing surgical repair of traumatic hip fracture.

## MATERIALS AND METHODS

The present study was undertaken in the Department of Orthopedics and Department of Anaesthesiology, Dr.Ulhas Patil Medical College & Hospital, Jalgaon Khurd, Jalgaon, Maharashtra (India) and it included assessment and comparison of hemodynamic effects of a “minidose” bupivacaine– fentanyl spinal anesthetic versus a conventional dose of spinal bupivacaine in elderly patients undergoing surgical repair of traumatic hip fracture.

### Number Patients

A total of 100 patients were enrolled in the present Comparative prospective study and were broadly divided into two study groups with 50 patients in each group as follows:

**Group 1:** “minidose” bupivacaine – fentanyl spinal anesthesia

**Group 2:** Conventional dose of spinal

bupivacaine

Ethical Approval was obtained from institutional ethical committee and written consent was obtained from each participant after explaining in detail the entire research protocol.

### Inclusion Criteria

- Patients within the age group of 25 to 60 years
- Patients who gave informed consent
- Patients who were scheduled to undergo surgical repair of traumatic hip fracture.

### Exclusion Criteria

- Patients who refused to give the informed consent
- Diabetic and hypertensive patients
- Patients with any known drug allergy

### Methodology

Complete demographic details of all the patients were recorded. Surgical treatment in all the patients included Richard’s plate screw internal fixation of femoral neck fractures and Austin–Moore hemiarthroplasty for subcapital fractures of the femoral neck. All the surgical procedures were performed under the hands of skilled and experienced orthopedic surgeons. Anesthesia was given to all the patients according to their respective group. Continuous monitoring of the hemodynamic parameters was done in all the patients.

### Statistical Analysis

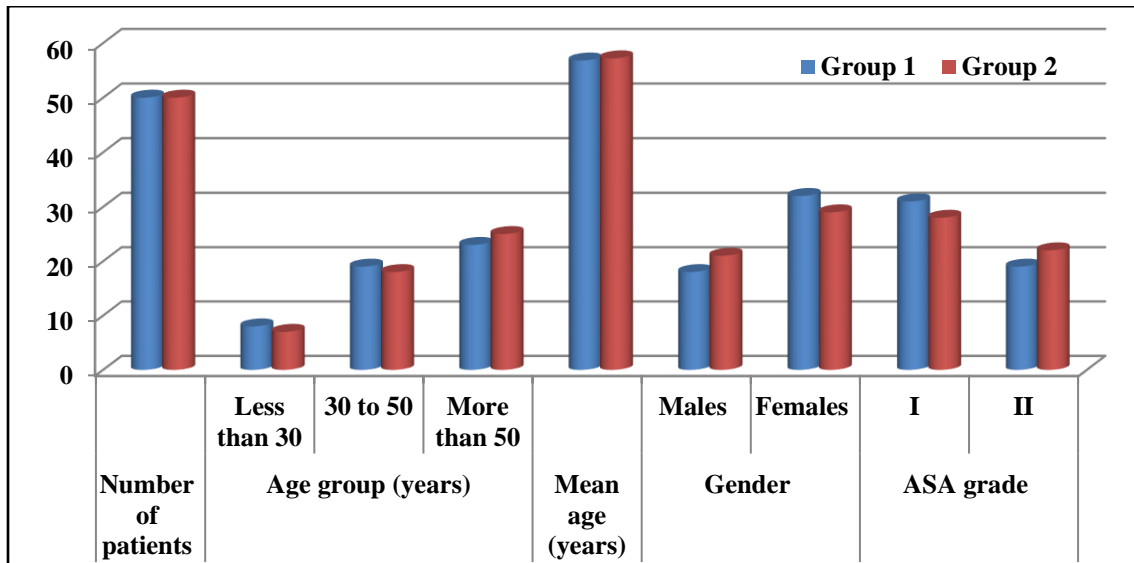
All the results were analyzed by SPSS software. One-way Chi- square test was used for assessment of level of significance. P- value of less than 0.05 was taken as significant.

**RESULTS**

In the present study, a total of 100 patients scheduled to undergo surgical repair for hip fractures were included in the present study. Mean age of the patients of the group 1 and group 2 was 56.8 years and 57.2 years respectively. There were 18 males and 32 females in the group 1 and were 21 males and 29

females in the group 2. In the present study, no significant results were obtained while comparing the mean arterial pressure among both the study groups at different time intervals. Also, no-significant difference was observed while comparing the mean heart rate at different time intervals in between the two study groups.

**Graph 1: Demographic profile of patients of both the study groups**



**Table 1: Comparison of mean arterial pressure at different time intervals**

Mean arterial pressure	Group 1	Group 2
At baseline	96	93
At induction	82	89
At 1 minute	99	97
At 3 minute	86	84
At 10 minute	88	91

**Table 2: Comparison of heart rate at different time intervals**

Heart rate	Group 1	Group 2
At baseline	86	88
At induction	82	87
At 1 minute	90	93
At 3 minute	81	82
At 10 minute	85	86

## DISCUSSION

Fragility hip fracture is a major cause of mortality and morbidity in the elderly. The primary goal of treatment for these fractures is to achieve stable and painless lower extremity as soon as possible. The optimal treatment for these injuries is surgery since non-operative treatment was associated with longer hospitalization, more mal-unions, and less likely to return to an independent level of functioning. It is then logical to perform early surgery for medically stable patients since prolonged immobilization is likely to increase the chance of pulmonary and urinary complications. However, for patients with significant co-morbidities, a longer period of pre-operative evaluation and optimization will be required.<sup>5-7</sup>

In the present study, a total of 100 patients scheduled to undergo surgical repair for hip fractures were included in the present study. Mean age of the patients of the group 1 and group 2 was 56.8 years and 57.2 years respectively. There were 18 males and 32 females in the group 1 and were 21 males and 29 females in the group 2. Ben-David B et al compared the efficacy of two different anesthetic solutions in patients undergoing hip fracture surgeries. Twenty patients aged  $>$  or  $=$  70 yr undergoing surgical repair of hip fracture were randomized into two groups of 10 patients each. Group A received a spinal anesthetic of bupivacaine 4 mg plus fentanyl 20 microg, and group B received 10 mg bupivacaine. Hypotension was defined as a systolic pressure of  $<$  90 mmHg or a 25% decrease in mean arterial pressure from baseline. Hypotension was treated with intravenous ephedrine boluses 5-10 mg up to a maximum 50 mg, and thereafter by phenylephrine boluses of 100-200 microg. All

patients had satisfactory anesthesia. One of 10 patients in group A required ephedrine, a single dose of 5 mg. Nine of 10 patients in group B required vasopressor support of blood pressure. Group B patients required an average of 35 mg ephedrine, and two patients required phenylephrine. The lowest recorded systolic, diastolic, and mean blood pressures as fractions of the baseline pressures were, respectively, 81%, 84%, and 85% versus 64%, 69%, and 64% for group A versus group B. A "minidose" of 4 mg bupivacaine in combination with 20 microg fentanyl provides spinal anesthesia for surgical repair of hip fracture in the elderly.<sup>8</sup>

In the present study, no significant results were obtained while comparing the mean arterial pressure among both the study groups at different time intervals. Also, no-significant difference was observed while comparing the mean heart rate at different time intervals in between the two study groups. Olofsson C et al assessed the efficacy of low-dose bupivacaine with sufentanil prevents hypotension after spinal anesthesia for hip repair in elderly patients. Fifty elderly patients were randomized into two groups. The study group received spinal anesthesia as a combination of hyperbaric bupivacaine 7.5 mg and sufentanil 5 microg while the control group received hyperbaric bupivacaine 15 mg. The hemodynamic stability of the patients and the quality of the blocks were compared. All patients had adequate duration of reliable blocks. More control group patients than study group patients required ephedrine due to hypotension. A reduced dose of hyperbaric bupivacaine (7.5 mg) in combination with sufentanil (5 microg) provides reliable spinal anesthesia for the repair of hip fracture in aged patients with few events of hypotension and little need for vasopressor support of blood pressure.<sup>9</sup>

## CONCLUSION

Under the light of above obtained results, the authors conclude that in elderly patients undergoing surgical repair for hip fractures

“minidose” of isobaric bupivacaine in combination with fentanyl delivers completely satisfactory spinal anesthesia. However; further studies are recommended.

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