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Original article

# Effect of Continuous versus Single Shot Spinal Anesthesia on Hemodynamic and Postoperative Cognitive Function for Elderly Patients Undergoing Lower Limb Surgeries; Randomized Controlled Study

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**Abstract**

**Background**: Continuous Spinal Anesthesia provides a good alternative to spinal anesthesia on hemodynamic and postoperative cognitive function for elderly patients undergoing lower limb surgeries. **Objectives**: To assess hemodynamic and postoperative cognitive function in elderly patients undergoing lower limb surgeries. **Subjects and methods**: This comparative randomized prospective clinical trial comprised 32 patients over 65 who was scheduled for elective lower limb surgeries estimated. Each patient received a regional anesthetic during the procedures, either through spinal anesthesia (SA) or continuous spinal anesthesia (CSA). **Result:** The results of the present study showed that there were no significant differences between groups regarding gender, age per years, Body mass index (BMI), American Society of Anesthesiologists (ASA status) or present of comorbidities among studied patients. There was a significantly lower dose of bupivacaine /mg needed in group CSA 11±1.03 versus 12±0 in group SA, $p<0.05$. **Conclusion:** the study compared continuous spinal anesthesia (CSA) and single-shot spinal anesthesia (SA) in elderly patients undergoing lower limb surgeries. The results showed that CSA provided better hemodynamic stability, longer-lasting analgesia, and required a lower dose of local anesthetic. However, SA seemed to be associated with improved early postoperative cognitive function. Both techniques were generally well-tolerated, but SA had a higher incidence of hypotension and bradycardia. Overall, the choice between CSA and SA should consider individual patient needs and surgical requirements.

**Keywords:** Shot Spinal Anesthesia, Elderly Patients, Lower Limb Surgeries.

## Introduction

Due to the population's continually increasing aging, there are now more senior individuals having surgery. The risks of perioperative problems are higher in older patients. Perioperative neurocognitive

disorder is one of them. Patients who are older than their younger counterparts are less able to withstand the pressures of surgery. The physiologic changes in the heart, kidneys, lungs, and other organ systems do not typically cause issues for senior patients, but if the patient is stressed out during the procedure or as a result of its consequences, there may not be enough functional reserve **[1] .**

For lower limb surgery, spinal anesthesia is a common anesthetic approach. It is frequently chosen because to its effectiveness, quick start, little impact on mental condition, ability to stop blood loss, and defense against thrombo-embolic consequences. However, spinal anesthesia carries a risk of severe and protracted hypotension due to the quick extension of the sympathetic block, which prevents cardiovascular adaptation and significantly increases morbidity and mortality **[2].**

Almost as old as spinal anesthesia itself, continuous spinal anesthesia (CSA) is a technique that is neglected in contemporary anesthesia practice. When compared to other neuraxial anesthesia procedures, CSA allows for incremental intrathecal local anesthetic dosing, which results in fewer hemodynamic changes **[3]**.

The use of conventional dose spinal anesthetic in high risk elderly patients is generally hampered by hemodynamic instability brought on by high block. Elderly patients are more likely to experience hypotension, which is riskier since their physiological reserves may be lower and their blood supply to numerous essential organs may be disrupted **[4].**

Elderly patients (≥ 60 years of age) often develop postoperative cognitive dysfunction (POCD), also known as postoperative central nervous system dysfunction, which is characterized by mental bewilderment, fear and anxiety, memory loss, social dysfunction, and other symptoms. POCD was frequently discovered at about 17–43%**[5].**

**Objectives**: Assessment of hemodynamic and postoperative cognitive function in elderly patients undergoing lower limb surgeries.

## Methods

After approval of Institutional Review Board (IRB#10446-26-2-2023) Zagazig University. This Randomized, double-blind clinical study was conducted on 32 patients over 65 who was scheduled for elective lower limb surgeries estimated. This study was carried out in the departments of Anesthesia, intensive care, and pain management at Zagazig University Hospitals. throughout six months started from March 2023 to September 2023. Written informed consent was obtained from all participants. The study was done according to The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

**Sample size:**

Assuming the frequency of no hypotension was 88.2% vs 35.3%, In continuous Spinal Anesthesia Vs Spinal Anesthesia. At 80% power and 95% CI, the estimated sample will be 32 cases,16 cases in each group.

A comprehensive history, physical examination, and investigations was all part of the preoperative evaluation. The latter included coagulation profile assessment, liver functions testing, kidney functions testing, and total blood count estimation, Random blood sugar, serum electrolytes, 12 lead electrocardiogram (ECG) and baseline cognitive function, after ECG, we was order any consultation required for preparation of

patient (Cardiology consultation was done routinely).

Each subject was assigned to either continuous spinal anesthesia (group C) or spinal anesthesia (group S) according to a computer-generated randomization table.

Group "C" **(**CSA group**):** patients was received 1ml of hyperbaric bupivacaine 0.5% intrathecally at the level of L3-L4 or L4-L5 vertebral spaces, catheter was fixed with subsequent addition of 0.5 ml hyperbaric bupivacaine 0.5% when needed for analgesia.

Group "S" **(**SA group**):** Patients was received 2.5 ml of hyperbaric bupivacaine 0.5% intrathecally at the level of L3-L4 or L4-L5 vertebral spaces.

Complete blood counts, liver and kidney function tests, coagulation profiles, and random blood sugar levels were performed on all patients, serum electrolytes, 12 lead ECG and baseline cognitive function.

**Technique:**

Patients received 500cc of Ringer's solution beforehand. Pulse oximetry, ECG, and automated noninvasive blood pressure monitoring were used to keep an eye on them. In the 24 hours leading up to the investigation, patients were not given any premedical treatment. After the patient is seated and in an entirely sterile environment, 2 ml of lidocaine 2% will be injected at L3-L4 or L4-L5 vertebral space. Patients are divided into 2 groups:

Group "C" (CSA group): 18G Tuohy epidural needle was inserted at the level of L3-L4 or L4-L5 vertebral spaces, after obtaining free flow of cerebrospinal fluid, a 22G A 2-3 cm-long epidural catheter was inserted into the subarachnoid area. Patients were seen 1 ml volume of (hyperbaric bupivacaine 0.5%) through a catheter, after which the catheter was secured and the patient was positioned supine. Addition of 0.5 ml later (hyperbaric bupivacaine 0.5%) when the level reached T12 **.**

Group "S" (SA group): 25 G pencil point spinal needle was introduced through L4-L5 rigorous aseptic care in interspaces. A 2.5 cc amount of 0.5% hyperbaric bupivacaine was administered to the patient. A 10-second intrathecal injection was administered. The patient was made to lie supine as soon as the injection was finished. Each patient will get oxygen (3 L/min) using a face mask. During surgery, patients were checked for their mean blood pressure and pulse every 5 minutes for the first 30 minutes, and then every 10 minutes until the procedure was over.

In case of any failure in either technique the matter was dismissed once general anesthesia was administered. The data was collected through the operation and after that in the inpatient wards for 24 hours. Catheters was removed after 24 hours in (CSA group).

The following variables and events were recorded:

Patient characteristic data (name, age, sex, Body mass index (BMI), American Society of Anesthesiologists (ASA status) physical status). Operation characteristics (Indication of operation and duration of operation in hour). Time to perform the anesthetic technique, Cardiorespiratory parameters (blood pressure, heart rate, and oxygen saturation); basal readings followed by readings every five minutes for the first 20 minutes of the procedure, then every ten minutes until it was finished. sensory and motor block beginning.

Side effects such as post-spinal headache, hypotension, bradycardia, urinary retention, neurological manifestations nausea and vomiting or other complication was monitored and evaluated in the postoperative period.

**Statistical Analysis**

Using (IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp. 2015), all data were gathered, tabulated, and statistically evaluated. Qualitative data were given as percentages and figures, whereas quantitative data were expressed as the mean, SD, and (range). The t test was used to compare two groups of normally distributed variables. The Mann-Whitney test was used to compare two sets of variables that weren't evenly distributed. The percentage of categorical variables was compared using the Chi-square test or Fisher exact test. Each test contained two sides. P values less than 0.05 were regarded as statistically non-significant (NS), and values greater than 0.05 as statistically significant.

## Results

According to the study's findings, there were no significant differences between groups regarding gender, age per years, BMI, ASA or present of comorbidities among studied patients as shown in **(Table 1).**

There were no significant differences between groups regarding onset, duration of motor block or duration of sensory block in studied groups. While there was significant delay in onset of sensory block in group CSA compared to group SA, p<0.05 **(Table 2)**.

There was a significantly lower dose of bupivacaine /mg needed in group CSA 11±1.03 versus 12±0 in group SA, p<0.05. There was no needed for ephedrine use in group CSA versus 3±5.37 in group SA, the difference statistically significant, p<0.05 **(Table 3).**

There were no statistical significant differences **(p > 0.05)** between CSA group and group SA regarding intraoperative heart rate **(Table 4).**

There were no statistical significant differences **(p>0.05)** between group CSA and group SA regarding basal MAP. There was a statistically significant decrease **(p<0.05*)** in MAP in group SA in all times of surgery than SA group **(Table 5)**.

There were no statistical significant differences **(p > 0.05)** between CSA group and group SA regarding intraoperative SPO2 **(Table 6).**

There were significant lower VAS score in group CSA during first four hours post-operative compared Group SA (p<0.05). Then there were significant higher VAS score in group CSA from five hours to 12 post-operative compared Group SA (p<0.05).otherwise there was no difference between both groups regarding postoperative VAS score, p>0.05**. (Table 7).**

There was a significantly delay first time to rescue analgesia in group CSA 2.5±0.52 hour versus 1.44±0.46 hour in group SA, also there was a significantly smaller total requirement rescue analgesia (tramadol) in group CSA 55±3.50 versus 94.37±4.03 in group SA p<0.05 **(Table 8).**

Regarding complications found in the current study, there was significant high percent of patients developed bradycardia in Group SA compared to group CSA, p<0.05.Otherwise there was no difference regarding other complications in both groups, p>0.05 **(Table 9)**.

| **Variables Table (1):** Patients' characters of studied groups | **Group (CSA) N=16** | **Group (SA) N=16** | **t** | **p** |
|---|---|---|---|---|
| **Gender n (%)**<br>**Males**<br>**Females** | <br>9(56.3)<br>7(43.7) | <br>10(62.5)<br>6(37.5) | 0.13[c] | 0.719 |
| **Age per years**<br>Mean ±SD<br>Range | <br>70.37±3.0<br>67-76 | <br>72.56±5.42<br>65-80 | 1.412 | 0.168 |
| **BMI**<br>Mean ±SD<br>Range | <br>29.56±2.39<br>27-33 | <br>30.69±2.65<br>26-34 | 1.260 | 0.217 |
| **ASA** n (%)<br>I<br>II | <br>3(18.8)<br>13(81.2) | <br>5(31.2)<br>11(68.8) | f | 0.685 |
| **Comorbidity** n (%)<br>Yes<br>no | <br>10( 62.5)<br>6(37.5 ) | <br>13(81.2)<br>3(18.8) | f | 0.433 |

ASA: The American Society of Anesthesiologists
Data were expressed as range, number and percent, or Mean ±SD [SD=standard deviation, f= fisher Exact test, χ 2 Chisquare test:c]
p<0.05 was considered significant, p>0.05 was considered no significant

**Table (2):** Onset and duration of both sensory and motor block in studied groups.

| **Variables** | **Group (CSA) N=16** | **Group (SA) N=16** | **t** | **p** |
|---|---|---|---|---|
| **Onset of sensory block (min)**<br>Mean ±SD<br>Range | <br>4.81±0.83<br>4-6 | <br>3.75±0.18<br>3.5-4 | 4.977 | 0.0001* |
| **Onset of motor block (min)**<br>Mean ±SD<br>Range | <br>7.78±1.12<br>6-9 | <br>7.63±1.12<br>6-9 | 0.426 | 0.763 |
| **Duration of sensory block(min)**<br>Mean ±SD<br>Range | <br>112.5±10.65<br>100-125 | <br>112.81±11.25<br>100-130 | 0.081 | 0.936 |
| **Duration of motor block(min)**<br>Mean ±SD<br>Range | <br>121.56±10.65<br>110-135 | <br>122.5±10.65<br>110-135 | 0.256 | 0.979 |

Data were expressed as range, Mean ±SD [SD=standard deviation, & range
t:Student' t test
p<0.05 was considered significant, p>0.05 was considered no significant

**Table (3):** Bupivacaine, ephedrine dose needed for studied groups

| **Variables** | **Group (CSA) N=16** | **Group (SA) N=16** | **u** | **p-value** |
|---|---|---|---|---|
| **Total dose of bupivacaine /mg** | 11±1.03<br>10-12 | 12±0.0<br>12-12 | 3.215 | 0.001 |
| **Dose of ephedrine used /mg** | .0000±0.0000<br>0.00-0.00 | 3±5.37<br>0.00-12 | 2.104 | 0.035 |

**Table (4):** Intraoperative heart rate (beat/ minute) in the studied groups

| Variables | Group (CSA) N=16 | Group (SA) N=16 | t | p-value |
|---|---|---|---|---|
| **Heart rate (basal )** | 76.25±5.53<br>68-83 | 77±2.19<br>74-80 | 0.504 | 0.618 |
| **HR5min** | 76.25±6.26<br>67-84 | 78±4.38<br>72-84 | 0.917 | 0.367 |
| **HR10min** | 76.25±5.53<br>68-83 | 79±3.65<br>74-84 | 1.660 | 0.107 |
| **HR15min** | 76.75±5.48<br>69-84 | 78±2.92<br>74-82 | 0.805 | 0.427 |
| **HR20min** | 78.19±2.97<br>74-83 | 79.31±5.15<br>75-97 | 0.757 | 0.455 |
| **HR30min** | 77.13±3.07<br>73-81 | 76.69±4.95<br>72-90 | 0.30 | 0.766 |
| **HR40min** | 75.43±2.33<br>72- 80 | 73±4.38<br>67-79 | 1.963 | 0.059 |
| **HR50min** | 73.5±2.16<br>70-78 | 72.13±1.89<br>69-75 | 1.910 | 0.056 |
| **HR60min** | 74±5.22<br>68-82 | 71.25±2.41<br>68-75 | 1.915 | 0.065 |
| **HR70min** | 72±2.19<br>69-75 | 73±3.65<br>68-78 | 0.939 | 0.355 |
| **HR80min** | 70±2.92<br>66-74 | 71±4.38<br>65-77 | 0.760 | 0.453 |
| **HR90min** | 72.31±3.75<br>67-77 | 72±5.11<br>65-79 | 0.197 | 0.84 |
| **HR100min** | 70±4.38<br>64-76 | 72±4.38<br>66-78 | 1.291 | 0.207 |
| **HR110min** | 71±5.11<br>64-78 | 71.13±6.03<br>62-79 | 0.063 | 0.950 |
| **HR120min** | 71±4.38<br>65-77 | 72±6.57<br>63-81 | 0.506 | 0.616 |

Data were expressed as range, Mean ±SD [SD=standard deviation, & range
t:Student' t test
$p<0.05$ was considered significant, $p>0.05$ was considered no significant

**Table (6):** Intraoperative SO2 in the studied groups:

| Variables | Group (CSA) N=16 | Group (SA) N=16 | t | p-value |
|---|---|---|---|---|
| **SPO2 basal** | 98.81±0.403<br>98-99 | 99±0.73<br>98-100 | 0.899 | 0.376 |
| **SPO25min** | 98.5±0.52<br>98-99 | 98.25±0.86<br>97-99 | 1 | 0.325 |
| **SPO210min** | 98.81±0.403<br>98-99 | 98.94±0.44<br>98-100 | 0.835 | 0.410 |
| **SPO215min** | 98.5±0.52<br>98-99 | 98.25±0.86<br>97-99 | 1.000 | 0.325 |
| **SPO220min** | 98.81±0.54 | 98.5±0.52 | 1.66 | 0.106 |

| | 98-100 | 98-99 | | |
|---|---|---|---|---|
| **Variables** | **Group (CSA) N=16** | **Group (SA) N=16** | **t** | **p-value** |
| **SPO230min** | 98.5±0.52<br>98-99 | 98.25±0.45<br>98-99 | 1.464 | 0.154 |
| **SPO240min** | 98.63±0.5<br>98-99 | 98.5±0.52<br>98-99 | 0.696 | 0.492 |
| **SPO250min** | 98.25±0.58<br>98-100 | 98.31±0.95<br>97-100 | 0.225 | 0.823 |
| **SPO260min** | 98.63±0.5<br>98-99 | 98.75±0.86<br>98-100 | 0.504 | 0.618 |
| **SPO270min** | 98.5±0.63<br>98-100 | 98.88±0.89<br>98-100 | 1.379 | 0.178 |
| **SPO280min** | 98.88±0.62<br>98-100 | 98.75±0.45<br>98-99 | 0.655 | 0.518 |
| **SPO290min** | 98.56±0.63<br>98-100 | 98.5±0.52<br>98-99 | 0.307 | 0.761 |
| **SPO2100min** | 98.75±0.45<br>98-99 | 98.5±0.52<br>98-99 | 1.464 | 0.154 |
| **SPO2110min** | 98.81±0.65<br>98-100 | 99.13±0.34<br>99-100 | 1.69 | 0.101 |
| **SPO2 120min** | 98.56±0.73<br>98-100 | 98.75±0.86<br>98-100 | 0.667 | 0.510 |

Data were expressed as range, Mean ±SD [SD=standard deviation, & range
t:Student' t test
p<0.05 was considered significant, p>0.05 was considered no significant

**Table (7):** Postoperative VAS in the studied groups:

| **Variables** | **Group (CSA) N=16** | **Group (SA) N=16** | **u** | **p-value** |
|---|---|---|---|---|
| **VAS 5 min** | .0000±0.0000<br>0.00-0.00 | 0.38±0.5<br>0.00-1 | 2.675 | .007 |
| **VAS 10 min** | .0000±0.0000<br>0.00-0.00 | 0.69±0.48<br>00.00-1 | 4.030 | 0.0001 |
| **VAS 15 min** | .0000±0.0000<br>0.0-0.0 | 0.88±0.62<br>0.00-2 | 4.247 | 0.0001 |
| **VAS 20 min** | .0000±0.000<br>0.0-0.0 | .81±0.66<br>0.00-2 | 3.977 | 0.0001 |
| **VAS 25 min** | .0000±0.0000<br>0.0-0.0 | 1.19±0.4<br>1-2 | 5.367 | 0.0001 |
| **VAS 30 min** | .0000±0.0000<br>0.00-0.00 | 1.63±0.5<br>1-2 | 5.268 | 0.0001 |
| **VAS 1hr** | 0.25±0.45<br>0.00-1 | 1.56±0.51<br>1-2 | 4.566 | 0.0001 |
| **VAS 2hr** | 1±1.27<br>0.00-3 | 3.06±0.57<br>2-4 | 3.939 | 0.0001 |
| **VAS 4 hr** | 2±1.79<br>1-5 | 3.81±0.54<br>3-5 | 2.619 | 0.0001 |
| **VAS 6 hr** | 4±0.73 | 2.63±0.5 | 4.307 | 0.0001 |

| | 3-5 | 2-3 | | |
|---|---|---|---|---|
| **Variables** | **Group (CSA) N=16** | **Group (SA) N=16** | **u** | **p-value** |
| **VAS 8hr** | 4.5±1.16<br>3-6 | 2.88±0.72<br>2-5 | 3.839 | 0.0001 |
| **VAS 12 hr** | 4±0.73<br>3-5 | 2.13±0.62<br>1-3 | 4.672 | 0.0001 |
| **VAS 16 hr** | 1.68±0.48<br>1-2 | 2±0.52<br>1-3 | 1.677 | 980.0 |
| **VAS 20 hr** | 1.5±0.52<br>1-2 | 1.81±0.54<br>1-3 | 1.579 | 0.114 |
| **VAS 24 hr** | 1.37±0.5<br>1-2 | 1.19±0.4<br>1-2 | 1.161 | 0.246 |

Data were expressed as range, Mean ±SD [SD=standard deviation, & range
U:Mann Whitnney test
p<0.05 was considered significant, p>0.05 was considered no significant

**Table (8):** Comparison of first time to rescue analgesia/hr and total requirement rescue analgesia in studied groups

| **Variables** | **Group (CSA) N=16** | **Group (SA) N=16** | **t** | **p-value** |
|---|---|---|---|---|
| **first time to rescue analgesia /hr** | 2.5±0.52 | 1.44±0.46 | 6.14 | .0001٭ |
| **Total requirement rescue analgesia(tramadol)** | 55±3.50 | 94.37±4.03 | .29.4 | .0001*0 |

**Table (9):** Comparison frequency of complications in studied groups

| **Variables** | **Group (CSA) N=16** | **Group (SA) N=16** | **$^{f}$P** |
|---|---|---|---|
| | **N(%)** | **N(%)** | |
| **Difficulty in technique** | 4(25.0) | 0.0 | 0.101 |
| **Vomiting** | 0.0 | 3(18.8) | 0.226 |
| **Shivering** | 4(25.0) | 2(12.5) | 0.564 |
| **Hypotension** | 1(6.3) | 5(31.2) | 0.17 |
| **Bradycardia** | 0.0 | 5(31.2) | 0.043* |

## Discussion

Spinal anesthesia (SA) is a popular anesthetic approach for elderly patients having lower limb surgery. It is frequently chosen because to its effectiveness, speed, little impact on mental state, reduction of blood loss, and defense against thromboembolic consequences**[6]**.

For surgeries on the perineum, lower extremities, and lower abdomen, continuous spinal anesthesia (CSA) is thought to be the best anaesthetic approach. Patients undergoing lower extremities surgery who have significant aortic stenosis and complicated cardiac disease may benefit from CSA**[7]**.

Most frequently, the single-shot spinal anesthesia (SSA) approach is used. Although typically safe, there are often reported problems or unpleasant effects. The most common hemodynamic complaint, excluding technical procedural errors, is arterial hypotension caused by a reduction in systemic vascular resistance as a result of sympathetic block. Age-related changes and accompanying disorders have been associated to arterial hypotension, which is particularly harmful in the elderly. The likelihood of arterial hypotension increases with patient age and higher sensory (analgesic) levels. These pathophysiological factors, along with the decreased physiological and cardiac reserve, combined with the accompanying disorders that these patients have, might result in an imbalance in the regulation of arterial pressure **[8]**.

In our current study the mean age was 70.37±3.0 in patients received Continuous Spinal Anesthesia (CSA) while it was 72.56±5.42 years in Patients received Single Shot Spinal Anesthesia (SA) with more prevalence of males 9(56.3%) in (CSA) group and 10(62.5%) in (SA) group. Regarding gender, age in years, or age per year, there were no notable variations between the groups, BMI, ASA or present of comorbidities among studied patients. There Additionally, there were no notable variations in the types of surgeries amongst the groups that were evaluated or duration of surgery.

Our study can be supported by **Kader et al[9]** who aimed to contrast continuous SA with single-shot SA in elderly patients after hip surgery in terms of both safety and effectiveness. According to their research, there was no discernible difference between the SA and CSA groups in terms of demographic information including age, sex, and weigh and ASA classification (p>0.05).

Regarding onset and duration of both sensory and Neither the onset nor the duration of the motor block, nor the duration of the sensory block, differed significantly across the groups in the analyzed groups. While there was a large difference between groups CSA and CSA in the timing of the start of sensory block SA (p<0.05).

In line with our results **Kader et al [9]** revealed that when the beginning of sensory block was compared across the groups, there was a significant difference in onset, with group CSA's onset being longer than that of the other groups (P=0.001). however, comparison When comparing the duration of the sensory block T12 regression between the groups, the group CSA demonstrated a significantly shorter duration than the other groups (P=0.001). Additionally, a comparison of the three groups' beginning of motor block revealed a significantly higher group CSA with the other groups (P=0.001). Comparison between duration of motor block in the three groups showed significant decrease in group CSA when compared with the other groups (P=0.001).

Concerning bupivacaine dose needed, there was a significantly lower dose of bupivacaine /mg needed in group CSA 11±1.03 versus 12±0 in group SA (p<0.05). While there was no need for ephedrine use in group CSA versus 3±5.37. The distinction in group SA was statistically significant (p<0.05).

Our findings agree with **Saber et al[10]** who showed that the CSA group mean value's bupivacaine dose was considerably lower of 5.50 ± 1.05 versus SD group mean value of 7.50±0.0 (p< 0.001).

Our findings revealed no statistically significant changes (p>0.05) in terms of intraoperative heart rate between the CSA group and group SA. Although there were no statistically significant variations (p>0.05) between group CSA and group SA regarding basal MAP. There was a statistically significant decrease (p<0.05) MAP in group SA was always surgically more than group SA. No statistically significant differences were found (p>0.05) between CSA group and group SA regarding intraoperative $SPO_2$.

In harmony with our findings **Kader et al [9]** found that the mean arterial blood pressure showed no significant difference in the baseline period (P=0.098). However, there were notable differences at 5, 10, 15, 30 min and 1, 2, 3 h after injection of local anesthetics, which was more of a group's mean arterial blood pressure fell SA when compared with the other groups (p<0.05).

Regarding post-operative VAS, there were significant lower VAS scores in group CSA during first four hours post-operative compared to Group SA (p<0.05). From five hours to 12 post-operatively, group CSA had significantly higher VAS scores than group SA (p 0.05). Otherwise, nothing changed between both groups regarding postoperative VAS score, p>0.05.

A recent RCT demonstrated a substantial correlation between postoperative nausea and vomiting, decreased pain scores during post-anesthesia care unit (PACU) stays, and high levels of patient and surgeon satisfaction anesthesia (RA) **[11, 12]**.

Concerning analgesic dose needed, there was a significant delay in first time to rescue analgesia in group CSA 2.5±0.52 hour versus 1.44±0.46 hour in group SA (p<0.05).

These findings are in line with those of **Biboulet et al. [13]**, who randomly assigned 45 patients who were 75 years of age or older, had physical status III or IV according to the American Society of Anesthesiologists, had cardiac comorbidities, and were undergoing hip surgery to receive continuous spinal anesthesia (CSA), propofol target-controlled infusion (TCI), or sevoflurane (SEVO). In CSA patients, a T10 metameric level target was reached by titrating 2.5 mg of bupivacaine boluses. In patients receiving TCI and SEVO, a bispectral value goal of about 50 was utilized to guide the concentration of propofol or sevoflurane. They asserted that the CSA group had fewer hypotension episodes than the TCI group (11.5; range, 1-25) and the SEVO group (10; range, 1-23) (P 0.001). In comparison to CSA patients, both TCI and SEVO patients required higher ephedrine (30.5 [15.5], 26 [23], and 1.5 [2.5] mg, respectively; P 0.001). In comparison to the TCI group (47% [8%]) and the SEVO group (46% [12%]), the CSA group's maximum mean arterial pressure reduction was lower (26% [17%]; P 0.001).

According to complications found in the current study, there were significant high percent of patients who developed hypotension and bradycardia in Group SA compared to group CSA (p<0.05). Additional than that, there was no difference between the two groups in terms of additional difficulties (p>0.05).

In concordance with **Kader et al [9]** revealed that 60% when compared to the other two groups, none of the patients in group CSA saw a substantial drop in blood pressure, while 15% of those in group SFA and group SA experienced hypotension (P=0.001). 15% of patients developed severe hypotension in group SA and 0% in group SFA and 0% that show CSA group had a significant drop in blood pressure compared to the other two groups (P=0.045). 10% of patients had nausea in group SA and no patient in the other two groups showing no significance difference (P=0.129). 10% of patients had temporary confusion in group SA and no patient in the other two groups showing no significance (P=0.129).

It is thought that RA increases the risk of sympathetic block, which can result in cauda equina syndrome or other neurological problems such radiculopathy and myelopathy, as well as the danger of producing severe bradycardia or intraoperative hypotension. Large anesthetic doses can be harmful to the lumbosacral roots directly, and local anesthetics' neurotoxic characteristics can cause irreparable neuron damage if they are not sufficiently diluted in the cerebrospinal fluid (CSF). General anesthesia (GA) is often used on spine patients, and anesthesiologists favor GA because it allows for the establishment of

a secure airway while the patient is lying on their back **[14]**.

**Conclusion:** In the study, older individuals undergoing lower limb procedures were given either continuous spinal anesthesia (CSA) or single-shot spinal anesthesia (SA). The outcomes demonstrated that CSA offered superior hemodynamic stability, longer-lasting analgesia, and required a lower dose of local anesthetic. However, SA seemed to be associated with improved early postoperative cognitive function. Both techniques were generally well-tolerated, but SA had a higher incidence of hypotension and bradycardia. Overall, the choice between CSA and SA should consider individual patient needs and surgical requirements. Further research is needed to confirm and expand on these findings.

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