Comparative study of Ultrasound Guided Combined Lumbo-Sacral Plexus Block Versus Continuous Spinal Anesthesia In Elderly Patients Undergoing Orthopedic Lower Limb Surgeries

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Abstract

Background : Previous studies found that the use of US guided combined lumbo-sacral plexus block and continuous spinal anesthesia provide good hemodynamics and minimal blood loss.**Aim:** To evaluate and compare between both US guided combined lumbo-sacral plexus block and continuous spinal anesthesia in elderly patients undergoing orthopedic lower limb surgeries regarding hemodynamic stability, blood loss and postoperative analgesic effect. **Methods:** The present study included 56 patients undergoing orthopedic lower limb surgeries aged (≥ 65 years) of both sex in Zagazig university hospitals. Patients distributed into two groups (28 patients in each group).US-LSPB group done by Shamrock technique for lumbar pleuxes block in combination with nerve stimulator receiving bupivacaine (0.25%) in volume of 30ml & 25µg fentanyl and parasacral parallel shift technique for sacral pleuxes block in combination with nerve stimulator receiving bupivacaine (0.25%) in volume of 20 ml & 25µg fentanyl. CSA group done by inserting catheter in the intrathecal space and injecting hyperbaric bupivacaine (0.5%) 1 ml (5mg) & 25µg fentanyl with top up doses after 2 segment regression 0.5 ml hyperbaric bupivacaine (0.5%) and at the end of the surgery 25µg fentanyl was administrated through the catheter for postoperative analgesia.Comparison was made regarding demographic data, duration of the technique, onset & duration of sensory and motor block, hemodynamics, amount of intraoperative blood loss, patient & surgeon satisfaction, failure rate, postoperative analgesia, 1st time & total dose of rescue analgesia and complication rate. **Results:**the study revealed significant difference among two groups as patients in US-LSPB group show slower onset and longer duration than CSA group, there was statistically highly significant difference between the studied groups regarding as it was higher in US-LSPB group 349.28 ml than CSA group 253.21 ml. And as regard patient & surgeon satisfaction, there was statistically significant differences between the studied groups where CSA group patients and surgeon were satisfied more than US-LSPB group patients and surgeon, there was significant difference among the studied groups as patients in US-LSPB group revealed prolonged analgesia 5.02±0.96 hr than CSA group 2.43±0.77 hr. Also, there was satistically significant difference between the studied group regarding total dose of rescue analgesia in 1st 24 hour postoperative (Nalbuphine/mg) as patients in CSA group require higher dose (19.15±1.25) than patients in US-LSPB group (10.64±1.52).**Conclusion:**that US-LSPB and CSA group are both effective and safe in elderly patients. But we found that US-LSPB had the advantage of prolonged postoperative analgesia and reduction of postoperative rescue analgesic requirements. However, CSA had the advantage of less intraoperative blood loss, rapid onset of the block and easier in performance than US-LSPB. And both have the advantage of maintaining hemoynamics stability. Although further studies may be needed to confirm these result.

Keywords: Ultrasound Guided, Lumbo-Sacral Plexus Block,Continuous Spinal Anesthesia, Orthopedic Lower Limb Surgeries

INTRODUCTION

Elderly patients have increased risk of perioperative mortality and morbidity due to additional co-morbidities such as cardiac, endocrine, renal, cerebral and respiratory diseases **[1]**. It has been shown that the use of neuraxial anestheticmethods during orthopedic lower limb surgeries reduces intraoperative blood loss and the risk of postoperative deep venous thrombosis **[2]**. Also, lower odds for the need of postoperative critical care services were reported in the use of neuraxialanesthesia compared with general anesthesia in thesepatients **[3].**

Lumbar plexus block (LPB) produces anesthesia of the major components of the ipsilateral lumbar plexus, the femoral nerve (FN), lateral femoral cutaneous nerve (LFCN) of the thigh, and the obturator nerve (OBN). LPB is used as a sole technique or in combination with a sacral plexus block for anesthesia or analgesia in patients having hip or lower extremity surgery. It is also referred to as psoas compartment block (PCB) or posterior lumbar plexus block (LPB). The term PCB was originally coined by **Chayen and colleagues** in 1976 **[4].** They believed that branches of the lumbar plexus and parts of the sacral plexus were located close to each other in a "compartment" between the psoas major and quadrates lumborum muscles at the level of the L4 vertebra and could be identified using "loss of resistance"**[5].**

An alternative approach for ultrasound guided LPB had been discovered by **Sauter and colleagues** in 2013 **[6]**who refer to as the "shamrock method. Transverse scan is performed at the flank and immediately above the iliac crest, with the patient in the lateral position and with the side to be blocked uppermost. Once the sonographic pattern of the "shamrock" is obtained at the level of the L4 transverse process, the US transducer is tilted slightly caudally until the acoustic shadow of the transverse process is no longer visualized **[6].**

The parasacral parallel shift technique blocks the sacral plexus proximal enough to provide anesthesia to the sciatic and posterior femoral cutaneous nerve (PFCN) of the thigh, as well the superior and inferior gluteal nerves, nerve to the quadrates femoris, and the pudendal nerve contained between the piriformis muscle posterior and the pelvic fascia anterior**[7].**

Continuous spinal anesthesia (CSA) provides extension of blockage during surgery and versatile pain management during the postoperative period via an indwelling catheter allowed intermittent injection of local anesthetic into the subarachnoid space. Better cardiovascular stability with a smaller dose of local anesthetic and rapid onset time were reported in CSA among patients undergoing major lower limb surgeries **[8]**. Conversely, CSA may lead to adverse hemodynamic changes due to the extent of sympathetic blockade which is affected by existing cardiac disease and intravascular volume status. Also, CSA was found to be associated with a high incidence of post-dural puncture headache (PDPH). This undesirable side effect was reduced by using smaller needles and microcatheters for the block procedure **[9].**

We aimed at this work to evaluate and compare between both US guided combined lumbo-sacral plexus block and continuous spinal anesthesia in elderly patients undergoing orthopedic lower limb surgeries regarding hemodynamic stability, blood loss and postoperative analgesia effect.

Patients and Methods:

This was Comparative prospective randomized double blind clinical trial that was carried out in Zagazig University Hospitals orthopedic operating room after obtaining Institutional Review Board (IRB) approval and informed consent from the patients. Patients were randomly assigned into one of two groups (28 patients in each group) using a computerized software program (Excel Random Sample Software version 7.0). US-LSPB group anesthesized by US guided lumbosacral pleuxes block and CSA group anesthesized by continuous spinal anesthesia.

Inclusion criteria Patients fulfilled the following criteria: Age ≥ 65 years of both sex , with ASA physical status II-III, Body mass index (BMI) < 30 kg/m² undergoing unilateral orthopedic lower limb surgeries with duration less than 3 hours.

Exclusion criteria Patients excluded from our study if one or more of the following criteria were present: Refusal of the patient, Patient with known allergy to study drugs, infection at the site of injection, coagulopathy or receiving anticoagulant medications, drug addict / patient on long term steroid therapy, Uncooperative patients / unable to understand pain assessment test, patient with anatomical abnormality of the spine, morbid obesity, CNS or peripheral neurological disease.

Methods All cases undergone:

History taking, and Patient Examination: All participating patients were interviewed preoperatively during their preoperative clearance appointment. The goal and endpoints of the study was discussed. Understanding of the US guided combined lumbo-sacral plexus block and CSA was reviewed and emphasized. On physical examination, special attention was given to document vital signs, cardiac, chest condition & exclude spine deformity. All patients was investigated by complete blood count, Liver functions test, kidney functions test, coagulation profile, blood sugar, ECG and chest X-ray and Echo.

Intraoperative: Standard monitors placed; pulse oximetry, non-invasive blood pressure cuff and ECG. Sedation with midazolam (2 mg IV) given in 30 second with running 8-10 ml/kg ringer solution will be administered via 18-gauge cannula in a peripheral vein. The patients' vital signs (blood pressure, heart rate and oxygen saturation) will be monitored and recorded throughout the procedure. General anesthesia requirements will be ready for use in case of failed regional block technique

Block Technique:

US-LSPB Group:US guided combined lumbosacral paravertebral block LPB performed with the Shamrock method. A convex , 2 to 5MHz, curved array US probe (Mindray M5, China) was used The patients was in the lateral decubitus position with the side to be anesthetised facing upwards. The transducer placed in the transverse plane on the flank of the patient cranially to the iliac crest. The quadrates lumborum muscle identified medial to the aponeurosis of the transverses abdominis muscle. The quadrates lumborum muscle inserts on the apices of the transverse processes L1-L4. The transverse process and vertebral body of L4 identified. With the psoas muscle anterior to the transverse process, the erector spinae muscle posterior to the transverse process and the quadrates lumborum muscle attached to the apex of the transverse process of L4, an easily recognizable pattern of a shamrock with three leaves identified. The nerve roots seen within the psoas muscle typically 2 cm anterior to the transverse process .The transducer was shifted slightly caudal until the transverse process of L4 disappear from the ultrasound image. The point of needle (Spinocan®, B.Braun, Melsungen, Germany) insertion was on the back of the patient, 4 cm lateral to the midlineon a line representing the intersection of the ultrasound beam with the skin. A 22-gauge, 4 inch spinal needle advanced in-plane and in the anterior direction. After the needle tip positioned lateral to the L3 spinal nerve, electrical nerve stimulator was applied (0.1ms impulse duration, 2Hz)to confirm the position of needle by femoral motor response in form of contraction of quadriceps muscle and reduce the risk of intraneural needle tip positioning. A threshold below 0.2mA indicated an intraneural needle position and require repositioning of the needle tip**[6].**

Following negative aspiration,30 mL of 0.25% bupivacaine& 25µg fentanyl injected into the lumbar plexus. The spread of local anesthetic was demonstrated by ultrasound.

After blocking lumbar plexus, the sacral plexus block was applied by Para Sacral Parallel Shift

technique(PSPS) in combination with the use of nerve stimulator. The probe aligned between the PSIS and the midpoint of the line connecting the PSIS and the greater trochanter. The iliac bone line identified ultrasonographically. The probe moved inferomedially with a parasacral parallel shift (PSPS). When the beam of the probe arrives at the sciatic notch, the ultrasonographic continuity of the iliac bone line was interrupted. This is exactly where the sacral plexus exits the pelvis. The probe tilted slightly caudal and the hyperechoic sacral plexus was visualized between the sacrum and the ischial bone and beneath the triangular piriformis muscle. The needle advanced in plane from the lateral end of the transducer through the piriformis muscle and until the needle tip touches the sacral plexus. The identity of the sacral plexus confirmed by nerve stimulator with a sciatic motor response in the range of 0.3-0.5 mA. Then 20 mL of 0.25% bupivacaine & 25µg fentanyl is injected with sonographic observation of perineural spread in the fascial space between the presacral pelvic fascia and the piriformis muscle**[7].**

Continuous spinal anesthesia (CSA) group: CSA was performed in the L_3-L_4 interspaced with the Patient sit on the operative table with back curved and flexed forward, the back prepared with an antiseptic solution and draped with a sterile towel, local skin infiltration with 1% lidocaine(2 ml), then an 18 gauge Tuohy needle (Perifix® 401 Filter Sets, B.Braun, Melsungen, Germany) introduced via a midline approach through the epidural space until cerebrospinal fluid observed in the needle. Then, the catheter advanced as fast as possible to diminish loss of CSF 2–4 cm into the intrathecal space and fixed using sterile tape. After the cerebrospinal fluid was aspirated, 5 mg (1 ml) hyperbaric 0.5% bupivacaine & 25µg fentanyl was injected manually while the patient in a supine position. Top up dose after 2 segment regression 0.5 ml of hyperbaric 0.5% bupivacaine. At the end of the surgery 25µg fentanyl was administrated through the catheter for postoperative analgesia. The catheter was removed 24 hour after surgery.

Assessment of the following:

Intra-operatively:

-Ease of the technique, Duration of the technique, Block characteristics as well as Vital signs

-Patient satisfaction:

By verbal rating score (VRS) for satisfaction with analgesia during the operation (0 = excellent, 1 = good, 2 = fair, 3 = poor)

-Surgeon satisfaction:

By Surgeon Satisfaction with Anesthesia Services (SSAS), the scale is composed of four levels (Strongly disagree, Disagree, Agree, Strongly agree)

-The amount of intraoperative blood loss (weighing the sponges used during surgery plus the amount of blood in the suction bottle) was recorded.**Anesthetic complications were assesed as** hypotension, bradycardia, nausea & vomiting, headache, total spinal block and neurological complications will be recorded.

Post-operatively:

1-Postoperative **side effects** such as incidence of hypotension, nausea & vomiting, bradycardia, backache and PDPH will be recorded.

2-Postoperative **pain** was evaluated at rest using visual analogue score (VAS) (0=no pain, 10=worst pain), pain scores will be recorded at 1^{st}, 2^{nd}, 4^{th}, 6^{th}, 12^{th}, $18^{th}$and 24^{th} hours postoperatively.

Statistical analysis

All data were collected, tabulated and statistically analyzed using Microsoft Office Excel 2010 for windows (Microsoft Cor., Redmond, WA, USA) and SPSS 22.0 for windows (IBM Inc., Chicago, IL, USA). Continuous Quantitative variables were expressed as the mean ± SD & median (range), and categorical qualitative variables were expressed as absolute frequencies (number) & relative frequencies (percentage). Continuous data were checked for normality by using Shapiro Walk test. Mann-Whitney U test was used to compare between two groups of non-normally distributed data. Categorical data were compared using Chi-square test or Fisher's exact test when appropriate. All tests were two sided. p-value < 0.05 was considered statistically significant (S), p-value < 0.001 was considered highly statistically significant (HS), and p-value ≥ 0.05 was considered statistically insignificant (NS).

Results:

Eligible patients for this study were analysed for the primary outcome and are shown in the flow chart. Sixty four patients were randomly divided into two groups. Six patients in US-LSPB group required general anesthesia due to failed or insufficient block and two patients in CSA group required general anesthesia due to difficult catheter threading and these patients were excluded from the study

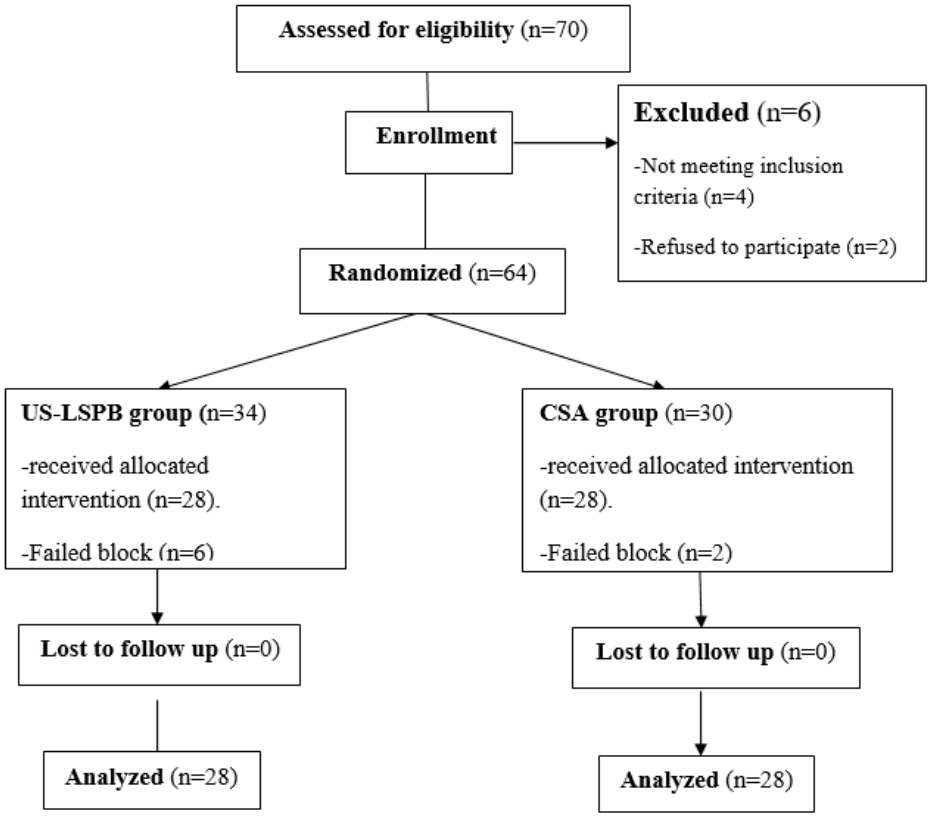

Figure (1): Patient flow chart.

Table (1): Comparison between US-LSBP group and CSA group regarding demographic and surgical data.

Demographic and surgical data	US-LSBP group (N=28)			CSA group (N=28)		Test	p-value (Sig.)
	No.	%		No.	%		
Gender							
Male	14	50%		16	57.1%	0.287[a]	0.592
Female	14	50%		12	42.9%		(NS)
Age (years)							
Mean±SD	69.10±1.44			69.14±1.77		-0.069[b]	0.945
Median (Range)	70 (66 – 72)			70 (66 – 74)			(NS)
ASA							
ASA II	4	14.3%		3	10.7%	0.163[a]	1.000
ASA III	24	85.7%		25	89.3%		(NS)
BMI (kg/m^2)							
Mean±SD	26.14±1.50			26.03±1.10		-0.400[b]	0.689
Median (Range)	26 (23 – 29)			26 (24 – 28)			(NS)
Duration of operation (min.)							
Mean±SD	140.89±13.05			142.85±14.87		-0.984[b]	0.325
Median (Range)	150 (120 – 160)			150 (120 – 160)			(NS)
Type of operation							
Internal fixation of femur	9	32.1%		8	28.5%	0.243[a]	0.640
Calcaneous	6	21.4%		5	17.8%		(NS)
Pott's	4	14.3%		4	14.3%		
Knee arthroscopy	2	7.1%		3	10.7%		
Tibial fixation	3	10.7%		2	7.1%		
Bipolar	4	14.3%		6	21.4%		

Categorical variables were expressed as number (percentage); Continuous variables were expressed as mean ± SD & median (range); a: Chi-square test; b: Mann Whitney U test; p-value<0.05 is significant; Sig.: Significance.

As shown in this table, there was no statistically significant differences between the studied groups regarding gender, age, ASA, BMI, duration of operation and type of operation.Most of cases of both groups were ASA grade III (85.7%) of US-LSPB Group and (89.3%) of CSA group.

Table (2): Comparison between US-LSBP group and CSA group regarding ease of technique and block characteristics.

	US-LSBP group (N=28)			CSA group (N=28)		Test	p-value (Sig.)
	No.	%		No.	%		
Level of the block							
T8	0	0%		12	42.9%	56.000[a]	<0.001
T10	0	0%		16	57.1%		(HS)
T12	20	71.4%		0	0%		
L1	8	28.6%		0	0%		
Ease of technique							
Easy	4	14.3%		15	53.6%	12.062[a]	0.002
Moderate	14	50%		11	39.3%		(S)
Difficult	10	35.7%		2	7.1%		
Duration of technique(min.)							
Mean±SD	14.75±1.10			4.17±0.72		-6.566[b]	<0.001
Median (Range)	15 (13 – 18)			4 (3 – 5)			(HS)
Onset of sensory block (min.)							
Mean±SD	8.46±1.10			5±1.01		-6.400[b]	<0.001
Median (Range)	8 (7 – 10)			5 (3 – 7)			(HS)
Time to achieve complete sensory block (min.)							
Mean±SD	14.82±1.49			8.78±0.95		-6.480[b]	<0.001
Median (Range)	15 (12 – 17)			9 (7 – 10)			(HS)
Onset of motor block (min.)							
Mean±SD	10.07±1.33			7.25±0.84		-6.045[b]	<0.001
Median (Range)	10 (8 – 12)			7 (6 – 9)			(HS)
Time to achieve complete motor block (min.)							
Mean±SD	16.14±1.01			12.53±1.31		-6.334[b]	<0.001
Median (Range)	16 (14 – 18)			12 (10 – 15)			(HS)
Duration of sensory block (min.)							
Mean±SD	292.50±39.49			126.42±13.93		-6.486[b]	<0.001
Median (Range)	300 (240 – 360)			120 (100 – 160)			(HS)
Duration of motor block (min.)							
Mean±SD	337.85±32.70			156.78±17.85		-6.490[b]	<0.001
Median (Range)	350 (280 – 400)			150 (120 – 180)			(HS)
Total bupivacaine consumption (mg)							
Mean±SD				9.62±1.24			
Median (Range)				10 (8.50 – 12.50)			

As shown in this table, there was statistically significant difference among the studied groups regarding ease of technique as it was difficult in 35.7% in US-LSPB group opposite 7.1% in CSA group.Also, there was highly statistically significant difference among the studied groups regarding level of the block as 71.4% in US-LSPB reach level T12 while 42.9% in CSA group reach level T8.

Also, there was highly statistically significant differences among the studied groups regarding duration of technique, onset of sensory block, time toachieve complete sensory block, onset of motor block, time to achieve complete motor block, duration of sensory block, duration of motor block (p-value<0.001) as US-LSPB group showed higher mean value (14.75±1.10, 8.46±1.10, 14.82±1.49, 10.07±1.33, 16.14±1.01, 292.50±39.49, 337.85±32.70) respectively.The mean value of total bupivacaine consumption (mg) was 9.62±1.24 in CSA group.

Table (3): Comparison between US-LSBP group and CSA group regarding patient and surgeon satisfaction.

Patient and physician satisfaction	US-LSBP group (N=28)			CSA group (N=28)		Test[a]	p-value (Sig.)
	No.	%		No.	%		
Patient satisfaction							
Excellent	4	14.3%		18	64.3%	17.327	0.001
Good	18	64.3%		8	28.6%		(S)
Fair	0	0%		1	3.6%		
Poor	6	21.4%		1	3.6%		
Surgeon satisfaction							
Strongly disagree	4	14.3%		0	0%	9.600	0.003
Disagree	2	7.1%		0	0%		(S)
Agee	14	50%		11	39.3%		
Strongly agree	8	28.6%		17	60.7%		

Categorical variables were expressed as number (percentage); a: Chi-square test; p-value<0.05 is significant; Sig.: Significance.

As shown in this table, there was statistically significant differences between the studied groups regarding patient and surgeon satisfaction (p<0.05) where 92.9% of CSA group patients and 78.6% of US-LSPB Group patients were satisfied. 78.6% of US-LSPB Group surgeons agreed and 100% of CSA group surgeons were satisfied.

Table (4): Comparison between US-LSBP group and CSA group regarding intraoperative data.

Intraoperative data	US-LSBP group (N=28)			CSA group (N=28)		Test	p-value (Sig.)
	No.	%		No.	%		
Requirement of 100µg Fentanyl during surgical procedure							
Not require	10	35.7%		23	82.1%	12.469[a]	<0.001
Require	18	64.3%		5	17.9%		(HS)
Amount of intraoperative blood loss (ml)							
Mean±SD	349.28±21.93			253.21±22.77		-6.517[b]	<0.001
Median (Range)	350 (300 – 400)			250 (200 – 290)			(HS)
Hypotension							
Absent	27	96.4%		26	92.9%	0.352[a]	1.000
Present	1	3.6%		2	7.1%		(NS)
Nausea & Vomiting							
Absent	28	100%		25	89.3%	3.170[a]	0.236
Present	0	0%		3	10.7%		(NS)
Bradycardia							
Absent	28	100%		27	96.4%	1.018[a]	1.000
Present	0	0%		1	3.6%		(NS)
Total spinal block							
Absent	28	100%		28	100%	0.000[a]	1.000
Present	0	0%		0	0%		(NS)
Neurological complications							
Absent	28	100%		28	100%	0.000[a]	1.000
Present	0	0%		0	0%		(NS)

Categorical variables were expressed as number (percentage); Continuous variables were expressed as mean ± SD & median (range); a: Chi-square test; b: Mann Whitney U test; p-value<0.05 is significant; Sig.: Significance.

As shown in this table, there was statistically highly significant difference between the studied groups regarding Requirement of 100µg Fentanyl during surgical procedure as in US-LSPB group 18 require fentanyl while 5 patients in CSA group require fentanyl.

Also, there was statistically highly significant difference between the studied groups regarding amount of intraoperative blood loss as it was higher in US-LSPB group (349.28±21.93) than CSA group (253.21±22.77).

Also, there was no statistically significant differences between the studied groups regarding intraoperative complications as hypotension required ephedrine was observed in one patient in US-LSPB group and two patients in CSA group, nausea & vomiting was observed in three patients in CSA group, bradycardia was observed in one patient in CSA group.

Table (5): Comparison between US-LSBP group and CSA group regarding VAS of pain.

VAS of pain	US-LSBP group (N=28)	CSA group (N=28)	Test[b]	p-value (Sig.)
1 hr Mean±SD Median (Range)	 0±0 0 (0 – 0)	 0.89±0.62 1 (0 – 2)	-5.647	<0.001 (HS)
2 hr Mean±SD Median (Range)	 1.39±0.49 1 (1 – 2)	 3.57±0.83 3 (2 – 5)	-6.530	<0.001 (HS)
4 hr Mean±SD Median (Range)	 2.39±0.83 2 (1 – 4)	 1.92±0.76 2 (1 – 4)	-2.132	0.033 (S)
6 hr Mean±SD Median (Range)	 2.89±1.70 4 (0 – 5)	 1.78±0.78 2 (1 – 4)	-2.197	0.028 (S)
12 hr Mean±SD Median (Range)	 2±0.98 2 (1 – 4)	 1.64±1.09 1 (0 – 4)	-1.489	0.138 (NS)
18 hr Mean±SD Median (Range)	 2±0.94 2 (0 – 3)	 2.21±0.73 2 (1 – 4)	-0.630	0.529 (NS)
24 hr Mean±SD Median (Range)	 2.10±0.83 2 (1 – 3)	 2.75±0.79 3 (1 – 4)	-2.558	0.011 (S)

Continuous variables were expressed as mean ± SD & median (range);b: Mann Whitney U test; p-value<0.05 is significant; Sig.: Significance.

As shown in this table, there was statistically highly significant difference (<0.001) between the studied groups regarding Visual Analogue Scale (VAS) at 1st , 2nd , 4th ,6th and 24thhr postoperative where CSA group showed higher VAS score 1st , 2nd and 24thhr, US-LSPB group showed higher VAS score at 4th and 6th hr.

Table (6): Comparison between US-LSBP group and CSA group regarding rescue analgesia.

Rescue analgesia	US-LSBP group (N=28)	CSA group (N=28)	Test[b]	p-value (Sig.)
1st time of rescue analgesia (hour)				
Mean±SD	5.02±0.96	2.43±0.77	-6.199	<0.001
Median (Range)	5 (4 – 7)	2 (2 – 4)		(HS)
Total dose of rescue analgesia in 1st 24hr postoperative (Nalbuphine/mg)				
Mean±SD	10.64±1.52	19.15±1.25	-6.435	<0.001
Median (Range)	10 (9 – 12)	18 (18 – 20)		(HS)

Continuous variables were expressed as mean ± SD & median (range);b: Mann Whitney U test; p-value<0.05 is significant; Sig.: Significance.

As shown in this table, the 1st time to request rescue analgesia (hour) was significantly higher in US-LSPB group (5.02±0.96) than CSA group (2.43±0.77).

Also, there was highly statistically significant difference between the studied group regarding total dose of rescue analgesia in 1st 24 hour postoperative (Nalbuphine/mg) as patients in CSA group require higher dose (19.15±1.25) than patients in US-LSPB group (10.64±1.52).

Table (7): Comparison between US-LSBP group and CSA group regarding postoperative complications.

Postoperative complications	US-LSBP group (N=28)			CSA group (N=28)		Test[a]	p-value (Sig.)
	No.	%		No.	%		
Nausea & Vomiting							
Absent	28	100%		25	89.3%	3.170	0.236
Present	0	0%		3	10.7%		(NS)
Bradycardia							
Absent	28	100%		28	100%	0.000	1.000
Present	0	0%		0	0%		(NS)
PDPH							
Absent	28	100%		26	92.9%	2.074	0.491
Present	0	0%		2	7.1%		(NS)
Backache							
Absent	28	100%		25	89.3%	3.170	0.236
Present	0	0%		3	10.7%		(NS)

Categorical variables were expressed as number (percentage); a: Chi-square test;p-value<0.05 is significant; Sig.: Significance.

As shown in this table, there was no statistically significant difference between the studied groups regarding postoperative complications.

Three patients in CSA group complained of each backache and nausea & vomiting and two patients complained of PDPH.

Discussion

Elderly patients have increased risk of perioperative mortality and morbidity due to additional co-morbidities such as cardiac, endocrine, renal, cerebral and respiratory diseases **[1]**. It has been shown that the use of neuraxial anesthetic methods during orthopedic lower limb surgeries reduces intraoperative blood loss and the risk of postoperative deep venous thrombosis **[2]**. Also, lower odds for the need of postoperative critical care services were reported in the use of neuraxial anesthesia compared with general anesthesia in these patients **[3].**

The current study compares between US guided combined lumbo-sacral plexus block and continuous spinal anesthesia in elderly patients undergoing orthopedic lower limb surgeries regarding amount intraoperative of blood loss, postoperative analgesia and hemodynamic changes.

The current study showed that there were highly statistically significant differences among the studied groups regarding duration of technique as US-LSPB group showed higher mean value (14.75±1.10 min.) than CSA group (4.17±0.72 min.).

The result of the current study agree with **Aksoy & his colleagues[10]** study: which carried on 70 patients over the age of 60 were divided into either PCSNB group (ultrasound-guided psoas compartment block was performed with modified Winnie technique using 30 ml 0.25% bupivacaine) or CSA group (CSA was performed on L3-L4 interspace using 2.5 ml of isobaric bupivacaine 0.5%) who revealed that application time of the anesthetic technique was significantly higher in PCSNB group (13.91±3.91 min.) than CSA group (9.37±1.72 min.).

Our study disagreed with **Imbelloni et al [8]** study which carried on 240 patients were randomly assigned to receive either CSA or CSE who revealed that the time taken for performing the block in CSA was (2.6 ± 0.9 min).

Regarding onset of sensory block, time to achieve complete sensory block, onset of motor block, time to achieve complete motor block, duration of sensory block, duration of motor block, our study revealed highly statistically significant differences among the studied groups (p-value<0.001) as US-LSPB group showed higher mean value (8.46±1.10, 14.82±1.49, 10.07±1.33, 16.14±1.01, 292.50±39.49, 337.85±32.70) minutes than CSA group (5±1.01, 8.78±0.95, 7.25±0.84, 12.53±1.31, 126.42±13.93, 156.78±17.85) respectively.

Our study were in contrary to **Horasanli et al [12]**study which carried on 80 patients (age range 18 to 65) undergoing knee surgery were randomly divided into epidural anesthesia (EA) group and the lumbar plexus-sciatic nerve blocks (LPSB) group, the onset of sensory block was 1 min, the onset of motor block was 18 min, the duration of motor block was 140 min. This different may be due to different anesthetic agents as they used 0.375% ropivacaine and the current study used 0.25% bupavacaine for lumbar plexus block.

Also, our study agreed with **Saber R & El Metainy S [12]** study which carried on 34 elderly high risk patients were assigned to one of the study groups (Group CSA and group SD single dose of spinal anesthesia) who found that duration of sensory block in CSA group was 122.6± 9.7 min.

The current study showed that the mean value of total bupivacaine consumption (mg) was 9.62±1.24 in CSA group.

In contrast **Aksoy et al[10]** study found that the total bupivacaine consumption(mg) in CSA group was 8.50±1.24, this different may be due to shorter duration of surgery 101.37±25.10 min than our study 142.85±14.87.

Also, our study disagreed with **Saber R & El Metainy S [12]** study who found that the total bupivacaine consumption(mg) in CSA group was 5.50± 1.05, this different may be due to shorter duration of surgery 85± 8.3 min than our study.

Our study were similar to **Elfeky et al [13]** study who found that found that the total bupivacaine consumption(mg) in CSA group was 9.80±1.66.

The current study showed that there was statistically highly significant difference between the studied groups regarding amount of intraoperative blood loss (ml) as it was higher in US-LSPB group (349.28±21.93) than CSA group (253.21±22.77).

This result were similar to **Aksoy & his colleagues[10]** study who found that the intraoperative blood loss (ml) in CSA group (283.14±68.66) is significantly lower than in PCSNB group (329.57±63.66).

The current study showed that there was statistically highly significant difference between the studied groups regarding Requirement of 100µg Fentanyl during surgical procedure as in US-LSPB group 18 require fentanyl while 5 patients in CSA group require fentanyl in contrast with **Askoy et al [10]** studywho found no patients in CSA group require fentanyl and all patients in PCSNB group require fentanyl during surgical procedure. This difference may be due to larger sample size than our study or as all patients needed propofol infusion during operation.

Also, this result were in contrary to with **Horasanli et al [11]**study who found that 8 patients in LPSB group require intraoperative propofol and fentanyl. This difference may be due to different anesthetic agents as they used 0.375% ropivacaine.

The current study showed that there was no statistically significant differences between the studied groups regarding intraoperative complications as hypotension required ephedrine was observed in one patient in US-LSPB group and two patients in CSA group, nausea & vomiting was observed in three patients in CSA group, bradycardia was observed in one patient in CSA group in contrast with **Askoy et al [10]** study who found that there is significantly difference between two groups as 13 patients in CSA group and 4 patients in PCSNB group developed hypotension required ephedrine this different as continue on propofol infusion.

Also, this result disagreed **Horasanli et al [11]**study who found that in LPSB group 5 patients developed hypotension, 2 patients developed bradycardia and 1 patient developed nausea this different may be due to large sample size.

The current study was similar to **Saber R & El Metainy S [12]** study who found that 2 patients in CSA group developed mild hypotension, but no patients developed nausea and vomiting.

The current study revealed statistically significant differences between the studied groups regarding patient and surgeon satisfaction where 92.9% of CSA group patients and 78.6% of US-LSPB Group patients were satisfied. 78.6% of US-LSPB Group surgeons agreed and 100% of CSA group surgeons were satisfied in agreement with **Horasanli et al [11]**study who found that 75.7% in the LPSB group patients were satisfied and 81% of LPSB group surgeons were satisfied.

The current study revealed statistically highly significant difference between the studied groups regarding Visual Analogue Scale (VAS) at 1^{st} , 2^{nd} , 4^{th} ,6^{th} and 24^{th}hr postoperative where VAS become ≥ 3 in CSA group after 2 hr and in group US-LSPB after 6 hour.

This result were similar to **Kundu & his colleagues [14]** study which carried on 60 patients were divided into group A received spinal anesthesia and group B received combined lumbar plexus and sciatic nerve block who found that in group B VAS became highest after 6 hour. Also, in agreement with **Stevens et al [15]** study which carried on 60 patients were randomized to receive general anesthesia with posterior lumbar plexus block or without (control group) who found that VAS score were significantly reduced in the plexus group until 6 hr.

The present study showed that the 1^{st} time to request rescue analgesia (hour) was significantly higher in US-LSPB group (5.02±0.96) than CSA group (2.43±0.77) in agreement with **Horasanli et al [11]** study who found that the 1^{st} analgesic request time was 360 min.

In contrast **Elfeky et al [13]** study who found that the duration of surgical analgesia in CSA group was 93.70 ± 15.44 min this difference may be due to administration of fentanyl at end of surgery through the catheter in our study for postoperative analgesia.

Our study showed that there was statistically significant difference between the studied group regarding total dose of rescue analgesia in 1st 24 hour postoperative (Nalbuphine/mg) as patients in CSA group require higher dose (19.15±1.25) than patients in US-LSPB group (10.64±1.52). In contrast to **Kundu et al [14]** study who found that total dose of analgesic required in 1st 24 hr in group B (combined lumbar sciatic block) was 200 mg pethidine this difference may be due to different analgesic agents used.

The present result shown that there was no statistically significant difference between the studied groups regarding postoperative complications. Three patients in CSA group complained of each backache and nausea & vomiting and two patients complained of PDPH.

This result were similar to **Elfeky et al [13]** study who found that 3 patients developed hypotension, 6 patients developed nausea & vomiting, 2 patients developed headache and 4 patients developed backache in CSA group. Also, **Saber R & El Metainy S [12]** study found that 4 patients developed hypotension, 5 patients developed bradycardia, 2 patients developed PDPH in CSA group.

Conclusion:

From the results of the study we conclude that US-LSPB and CSA group are both effective and safe in elderly patients. But we found that US-LSPB had the advantage of prolonged postoperative analgesia and reduction of postoperative rescue analgesic requirements. However, CSA had the advantage of less intraoperative blood loss, rapid onset of the block and easier in performance than US-LSPB. And both have the advantage of maintaining hemoynamics stability. Although further studies may be needed to confirm these results.

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