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COMBINED LUMBAR-SACRAL PLEXUS BLOCK- BOON FOR GERIATRIC PATIENTS

Dr. Nipa C. Nayak	Associate Professor, Dept of Anaesthesiology, Shri M P Shah Medical College, Jamnagar, Gujarat
Dr. Prashant C. Sorathiya*	Assistant Professor. , Dept of Anaesthesiology, Shri M P Shah Medical College, Jamnagar, Gujarat*Corresponding Author
Dr. Jaydev K. Dave	Professor, Dept of Anaesthesiology, Shri M P Shah Medical College, Jamnagar, Gujarat
Dr. Vanita Dabhi	2nd year resident, Dept of Anaesthesiology, Shri M P Shah Medical College, Jamnagar, Gujarat

ABSTRACT **Objective:** To compare intraoperative hemodynamic stability and postoperative pain relief. **Materials and Methods:** Randomized controlled prospective study done on 200 pts.of either sex of ASA grade 3 and 4 posted for lower limb surgery. GroupA received lumbar- sacral plexus block via PNS, Injection of 0.5% Bupivacaine plain (10 ml) with inj. Lignocaine 2% plain(10 ml) diluted with 0.9% normal saline 10 ml, total volume 30 ml, out of which 25 ml given at lumbar plexus and same dilution 20 ml given in sacral plexus and group B received spinal anaesthesia with 0.5% bupivacaine heavy. **Statistical Analysis Used**: Unpaired T test, Mann Witney U test **Results:**In our study intraoperative incidence of hypotension and bradycardia was found higher in group B than group A. In postoperative period VAS score difference between two groups was found is statistically significant in group A as compared to group B till 72 hours postoperative. **Conclusion:** Combined lumbar-sacral plexus block is effective method for unilateral lower limb surgery and postoperative analgesia in high risk geriatric patients.

KEYWORDS : Combined Lumbar-Sacral plexus block(CLSB), Spinal anaesthesia, Geriatric age, Peripheral nerve stimulator(PNS)

INTRODUCTION

For lower limb surgeries, neuraxial and general anaesthesia are tried and true methods. They provide reliable, quick way to establish surgical anaesthesia. Various surgeries of lower limb such as total hip or knee arthroplasty, knee ligament reconstruction, femur nailing or plating etc. are associated with pain which can contribute to immobility related complications, delay in hospital discharge, and interfere with functional outcome.[1,2,4]The outcome of pain management in these kind of patients affects both hospital and patients cost, length of hospital stay and time to patient remobilization.[1,3]Various analgesic techniques should aim to provide adequate pain relief with lowering its side effects. Regional analgesia can achieve these benefits by improving functional recovery facilitated by more rapid and effective joint rehabilitation.[1,5]Regional anaesthesia techniques reduce neuro-endocrine stress responses, muscle spasm and central sensitization of nervous system which occur in pain stimuli.[1,7]

Lower limb blocks have traditionally been less popular than their counterparts in upper limb and in lower limb surgery. Spinal anaesthesia has been used used extensively, because of its rapid onset and simpler to perform than other regional techniques and such benefits must be weighed against adverse events like postdural puncture headache, backache, difficulty in voiding and sometimes rarely for hematoma and infection.[1,6]Spinal anaesthesia with adjuvant provide postoperative pain relief for 3-4 hours. Systemic opioids are another option for postoperative pain relief but it may produce undesirable side effects likePONV, respiratory depression. An alternative regional anaesthesia technique is peripheral nerve blockade(PNB) of one or more major nerves supplying the lower limb. The advent of peripheral nerve stimulator, ultrasonography, improved rehabilitation outcomes, reduced frequency of post op vomiting, urinary retention and earlier discharge have led to renewed interest in lower limb blocks that may provide effective unilateral analgesia for prolonged period with lower incidence of side effects related to opioid and fewer serious neurological complications compared with spinal anaesthesia.[1,8]So,we decided to revisit these blocks to access and compare primarily post op analgesia and intra operative hemodynamic stability and complications related to technique.

To provide anaesthesia and analgesia to entire leg combination of lumbar and sacral plexus block is necessary.[9]

MATERIALAND METHOD

After institutional ethical clearance and informed written consent, geriatric patients of ASA grade III- IV elective lower limb surgeries were taken.

Exclusion criteria

- Patient refusal
- Sensitive to local anesthetics
- Infection at site of puncture
- Bleeding disorder
- Sepsis
- Psychiatric illness
- Anxious or Agitated patients etc.

All patients were assessed for history, examined in detail both general and systemic examination. They were explained about the purpose, procedure and side effect of the procedure. Patient kept NBM. All resuscitative measures kept ready before performing the block. Iv line taken, Basic monitors applied like ECG, NIBP, Spo2, and vitals of patient taken. Preloading with inj. RL 10 ml/kg done.All the patients in both groups are premedicated with inj. Glycopyrrolate 0.2 mg im.Lateral decubitus position is given keeping operating limb up.

Under all aseptic precaution painting and draping done at the site of injection.

Group-B received spinal anaesthesia with injection bupivacaine 0.5% heavy according to patient's body weight and duration of surgery. Spinal anaesthesia is given in lateral position with 25g BD spinal needle.

Group-A received combined lumbar-sacral plexus block via posterior approach. The patient is in the lateral decubitus position with slight forward tilt. The foot on the side to be blocked should be positioned over dependent leg so that twitches of quadriceps and/or patella can be easily seen. For lumbar plexus block – landmarks include 1. Midline(spinous process), 2. Iliac crest. 3. Needle insertion labeled 4 cm lateral to the intersection of landmark 1 and 2. The stimulation of lumbar plexus at that level by 10 cm long, 22g, short bevel, insulated stimulating needle of PNS produces contraction of quadriceps muscle and the movement of patella, creating a spectacle known as “dancing patella”. If the transverse process is contacted, the needle is walked off

the bony structure, and the lumbar plexus is identified within next 1.5-2.0 cm. After twitches are obtained, current should be lowered to obtain stimulation between 0.5-1 ma. At this point local anaesthetic is given slowly with frequent aspiration to rule out inadvertent i.v., epidural and intrathecal placement of the needle.

For sacral plexus block- landmark includes, a line drawn between posterior superior iliac spine(PSIS) and the lowest point of ischial tuberosity. Needle insertion point lies 3 finger breadth inferior to PSIS on this line(6 cm). The stimulation of sacral plexus at that level by 10 cm long, short bevel, insulated stimulating needle of PNS produces planter flexion of the foot or toes(tibial division of sciatic nerve) or dorsiflexion/eversion of the foot or toes(peroneal division of sciatic nerve). After twitches are obtained, current should be lowered to obtain stimulation upto 0.5 ma. At this point local anaesthetic is given slowly after aspiration. During injecting drugs constant verbal contact with patient is maintained throughout the both procedures.

Injection of 0.5% bupivacaine plain (10 ml) with inj. Lignocaine 2% plain(10 ml) diluted with 0.9% normal saline 10 ml, total volume 30 ml, out of which 25 ml given at lumbar plexus and same dilution 20 ml given in sacral plexus.

Sensory analgesia to ice application was assessed up to 30 min in distribution of nerves of lumbar plexus, femoral nerve, lateral cutaneous nerve,obturator nerve and branches of sciatic nerve that is tibial nerve and common peroneal nerve using visual analogscore (VAS), in which VAS< 3 indicate onset of analgesia. Motor block was assessed using Modified Bromage scale (0-3). Pulse and BP also monitored.

Inadequate sensory and motor block were assessed and treated with sedation in the form of Inj. pentazocine, promethazine and inj ketamine.
Failure of block is defined as:

- If VAS > 5 in the distribution of two or more nerves after 30 min of injecting drug.
- Bromage scale <2 after 30 min oInj ecting drug.
- Block insufficient to perform surgery and needs spinal anaesthesia or general anaesthesia.

RESULTS

Total 200 patients were selected. In group A total 4 patients were required spinal anaesthesia after CLSB was given due to inadequate analgesia and muscle relaxation. Both the groups were comparable with respect to age, sex and weight.

The difference in mean heart rate between two group is statistically significant at 1,5,15,45 mins.

The difference in SBP between two groups were statistically highly significant from 5 mins to 120 mins.

The difference in DBP between two groups were statistically significant upto 75 mins.

There is highly statisticaliy significant difference in VAS score between both groups suggest total duration of analgesia was found significantly higher in group A than in group B.

In group A total 38 out of 100 patients were required post op rescue analgesia. Where as in group B all patients 100 out of 100 were required post op analgesia.

Group B patients have hypotension and tachycardia(58%) are much more common than group A patients(20%). In most of the patients skin infiltration at the site of incision was done after CLSB.

Table 1: mean pulse at various time interval intra-operatively

Group		N	Mean	Std. Deviation	95% CI Lower	95% CI Upper	p value
Before premedication	Group A	100	86.10	16.089	-19.861	-10.099	.000
	Group B	100	101.08	18.806			
Before Induction	Group A	100	100.09	20.030	-8.251	2.631	.310
	Group B	100	102.90	18.972			
@1min	Group A	100	99.75	21.066	-13.629	-1.311	.018
	Group B	100	107.22	23.057			
@5min	Group A	100	94.76	22.503	-16.945	-3.855	.002
	Group B	100	105.16	24.393			
@15min	Group A	100	93.13	20.318	-16.170	-3.330	.003
	Group B	100	102.88	25.434			
@30min	Group A	100	92.61	19.846	-9.584	.764	.094
	Group B	100	97.02	17.161			
@45min	Group A	100	91.26	18.920	-13.411	-3.229	.001
	Group B	100	99.58	17.568			
@60min	Group A	100	91.01	19.230	-8.103	.883	.115
	Group B	100	94.62	12.219			
@75min	Group A	100	88.86	21.338	-9.995	.035	.052
	Group B	100	93.84	13.832			
@90min	Group A	100	93.34	23.787	-4.273	6.793	.654
	Group B	100	92.08	14.880			
@105min	Group A	100	93.62	25.080	-5.979	5.219	.894
	Group B	100	94.00	13.312			
@120min	Group A	100	92.90	23.904	-5.791	5.071	.896
	Group B	100	93.26	13.676			

Table 2: SBP at various time interval intra-operatively

Time	Group	N	Mean	Std. Deviation	95% Confidence Interval of the Difference Lower	Upper	p value
SBP before premedication	Group A	100	124.58	19.763	-11.628	-.932	.022
	Group B	100	130.86	18.572			
SBP before induction	Group A	100	127.22	19.807	-12.428	-2.052	.006
	Group B	100	134.46	17.314			
@1min	Group A	100	124.28	18.950	-4.044	4.884	.853
	Group B	100	123.86	12.379			
@5min	Group A	100	125.34	22.802	5.587	16.693	.000
	Group B	100	114.20	16.525			
@15min	Group A	100	127.78	19.246	11.909	22.251	.000
	Group B	100	110.70	17.806			
@30min	Group A	99	128.97	17.816	9.325	18.335	.000
	Group B	100	115.14	14.225			
@45min	Group A	100	128.82	20.556	10.447	20.993	.000
	Group B	100	113.10	17.097			
@60min	Group A	100	130.72	19.535	9.832	19.288	.000
	Group B	100	116.16	13.902			
@75min	Group A	100	128.34	24.163	4.377	15.103	.000
	Group B	100	118.60	12.480			
@90min	Group A	100	130.40	24.863	6.184	17.496	.000
	Group B	100	118.56	14.299			
@105min	Group A	100	130.26	21.927	6.061	16.499	.000
	Group B	100	118.98	14.821			
@120min	Group A	100	129.72	22.200	5.336	15.864	.000
	Group B	100	119.12	14.826			

Table 3 : DBP at various time interval

Group		N	Mean	Std. Deviation	95% CI Lower	95% CI Upper	p value
DBP before Premedication	Group A	100	76.78	9.359	-8.061	-3.499	.000
	Group B	100	82.56	6.799			
DBP before induction	Group A	100	78.36	9.013	-9.364	-4.716	.000
	Group B	100	85.40	7.593			
@1min	Group A	100	76.80	9.048	-5.403	-.397	.023
	Group B	100	79.70	8.901			
@5min	Group A	100	76.18	9.889	.615	6.065	.017
	Group B	100	72.84	9.649			
@15min	Group A	100	77.98	8.924	1.814	7.066	.001
	Group B	100	73.54	9.884			
@30min	Group A	100	79.02	8.755	1.321	6.439	.003
	Group B	100	75.14	9.578			

@45min	Group A	100	78.44	8.760	.980	6.620	.009
	Group B	100	74.64	11.303			
@60min	Group A	100	79.50	7.677	1.953	6.287	.000
	Group B	100	75.38	7.861			
@75min	Group A	100	78.46	7.805	.126	4.554	.038
	Group B	100	76.12	8.069			
@90min	Group A	100	78.74	8.653	-.595	4.115	.142
	Group B	100	76.98	8.227			
@105min	Group A	100	79.44	8.571	.289	4.831	.027
	Group B	100	76.88	7.693			
@120min	Group A	100	79.04	7.896	-.803	4.243	.180
	Group B	100	77.32	10.067			

Table 4: VAS score at different time interval post operatively

Group		N	Mean rank	P value
vas@12hrs	Group A	100	53.75	0.000
	Group B	100	147.25	
VAS@24hrs	Group A	100	52.79	0.000
	Group B	100	148.21	
vas@48hrs	Group A	100	60.75	0.000
	Group B	100	140.25	
vas@72hrs	Group A	100	87.89	0.002
	Group B	100	111.99	

DISCUSSION

High risk geriatric patients undergoing lower limb orthopaedic surgery require more attention and care due to their fragile nature. So PNB with CLSB has a site-specific effect on one leg only with lesser physiological disturbance and comparable anaesthetic effect, is considered to be more suitable alternative of neuraxial and general anaesthesia.[17]

Many studies have done for lumbar plexus block via psoas approach for orthopaedic lower limb surgery along with sacral plexus or sciatic nerve block. Our study done with combination of lumbar-sacral plexus block and showed that it provides effective anaesthesia and analgesia with lesser complications in compared to spinal anaesthesia. Study done by de Visme, et al. reported that less hypotension and good analgesia in elderly patients undergoing hip fracture repair with combined psoas compartment and sciatic nerve block compared to spinal anaesthesia.[10]

In group A duration of analgesia was longer than group B and analgesic requirement was less in group A compared to group B. This finding is comparable to study done by moreno et al., which reported prolonged and excellent postoperative analgesia.[11]

The VAS score, highly significant for prolonged postoperative period in group A than in group B. Luber et al., reported lumbar plexus block has advantages of early postoperative analgesia which is comparable with our findings.[12]Requirement of 1st dose of rescue analgesia in lumbar plexus-sciatic nerve block postoperatively was delayed compared to epidural anaesthesia in study done by Horasanali.[13] PetcharaS et al. Reported similar findings that CLSB has excellent efficacy for perioperative and postoperative analgesia without major anaesthetic related complications.[17]Combined lumbar –sacral plexus block has been proven as a safe and effective method in perioperative pain control as a standard anaesthetic method.[10,18-20]

The study of Auroy et al. reported high incidence of lumbar plexus block and neurological complication mainly seizures, transient neurological damages and cardiac arrest after use of nerve stimulator used for peripheral nerve block.[16]in our study no such complications were found.

4 out 100 patients in group A were converted in spinal anaesthesia while no patients in group B converted to general anaesthesia from spinal anaesthesia. We have used peripheral nerve stimulator for lumbar-sacral plexus block. Radiographically assisted techniques increase potential of success rate of all kind of block including lumbar-sciatic nerve block for providing anaesthesia.[14,15]

CONCLUSION

The benefit of our study demonstrated that peripheral nerve stimulator guided combined lumbar-sacral plexus block as a sole anaesthetic techniqueprovides effective unilateral anaesthesia and prolonged better postoperative analgesia in high risk geriatric patients undergoing lower limb orthopaedic surgery. One of the great advantage of lumbar-sacral plexus block withmodern techniques for nerve localization is providing excellent anaesthesia and postoperative analgesia results in early limb mobilization and rehabilitation of patients with lesser complications.

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