



FEMORAL NERVE BLOCK VERSUS ADDUCTOR CANAL BLOCK WITH 0.5% ROPIVACAINE FOR POST-OPERATIVE PAIN RELIEF IN LOWER LIMB SURGERIES PERFORMED UNDER SPINAL ANAESTHESIA

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ABSTRACT **Background and aim:** Post-operative pain is an important consequence of lower limb surgeries that can effect early ambulation, range of motion and duration of stay in hospital. The aim of this study was to compare and assess efficacy of adductor canal block and femoral nerve block for post-operative analgesia in lower limb surgeries performed under spinal anaesthesia. **Material and methods:** Sixty patient aged 18-70 years scheduled for lower limb surgeries under spinal anaesthesia were included. The patients were randomly divided to two equal groups of 30 each. At the end of surgery single shot ultrasound guided adductor-canal-blockade was given with 30 ml of 0.5% ropivacaine (group A) or single shot ultrasound guided femoral nerve block was given with 30 ml of 0.5% ropivacaine (group F). Pain was assessed on 10 point VAS score during 24 hours postoperatively. Motor function was assessed with straight leg raise test. **Results:** Analgesic consumption was lesser in group A as compared to group F. VAS were favorable in group A. There was prolonged loss of motor function in group F. **Conclusions:** Adductor canal block and femoral nerve block provide effective post-operative analgesia in lower limb surgeries performed under spinal anaesthesia using ropivacaine 0.5%. However quadriceps muscle strength is preserved in adductor canal block as compared to femoral nerve block. Hence adductor canal block can be effectively and safely administered for post operative analgesia in such patients.

KEYWORDS : Adductor canal block, spinal anaesthesia, ropivacaine, femoral nerve block

INTRODUCTION:

Post-operative pain is an important factor in lower limb surgeries that can effect early ambulation, range of motion and duration of stay in hospital.¹ Adequate analgesia with motor preservation has become the prime goal after lower limb surgeries to enable faster recovery and shorten the hospital stay. Various techniques are available for the treatment of postoperative pain including systemic analgesics (intravenous, PCA) and regional analgesia (epidural and peripheral nerve blocks).² However systemic analgesic have many adverse effect. Hence multimodal analgesia techniques are being widely used which include combination of systemic and regional analgesia.

Among regional techniques epidural is most widely used but may have adverse effects like hematoma formation and urinary retention.³ Therefore to avoid these side effects peripheral nerve block (femoral nerve block and adductor canal block) is introduced.

Femoral nerve block provides effective analgesia but has been associated with quadriceps weakness and delayed ambulation as femoral nerve has both sensory and motor components.⁴ Hence adductor canal block is being used since it results in blockade of saphenous nerve which is purely sensory.⁵

With the development of ultrasound technique, the adductor canal, an aponeurotic structure could be visualized easily in the middle third of thigh. It extends from the apex of the femoral triangle to the opening in the adductor magnus, the adductor hiatus. This canal is traversed by saphenous nerve which is branch of femoral nerve. Blockade of this nerve provides analgesia with preservation of quadriceps muscle strength hence facilitating early ambulation.⁷

SUBJECTS AND METHODS:

This prospective randomized comparative study was conducted at Mahatma Gandhi Medical College & Hospital, Jaipur. Institutional ethics committee and scientific committee approval was obtained prior to conducting the study.

INCLUSION CRITERIA

are ASA Class I or II and Patients scheduled for lower limb surgery under subarachnoid block.

EXCLUSION CRITERIA

are Patient with known allergy to ropivacaine and if spinal anaesthesia had resolved before conducting the block Total 60 patients were included and randomly divided into two equal groups using chit in the box method.

Group (F) [n=30] will be given femoral nerve block with 0.5% ropivacaine 30 ml using ultrasonography technique.

Group (A) [n =30] will be given adductor canal block with 0.5% ropivacaine 30 ml using ultrasonography technique.

TECHNIQUE:

At the end of surgery ultrasound guided adductor canal block was performed. For adductor canal block (group A) linear ultra sound transducer was placed at mid-thigh level. The superficial femoral vessels was identified; deep to the sartorius muscle. The 22G spinal needle was advanced toward the adductor canal. For femoral nerve block (group F) ultra sound transducer was placed on inguinal crease, with slight cephalic tilt, the femoral artery and femoral nerve was identified. The 22G spinal needle was advanced toward the femoral nerve.

After procedure the postoperative pain, muscle weakness and first rescue analgesia requirement were evaluated at frequent intervals till the demand of rescue analgesia.

Quantitative data were summarized as mean \pm SD while qualitative and categorical variables as absolute numbers and percentages. 'p' value <0.05 was taken as significant.

RESULTS:

All patients were randomly divided into two groups [Group A (n=29), Group F (n=30)] on the basis of chit in the box. In group A one of the case had failure of block.

All patients were demographically comparable with regard to age, weight, height (Table 1) in both the groups.

VAS pain score between the groups is comparable with P value >0.05 which is statistically not significant. (Table 2, Figure 1)

The time of first rescue analgesia was significantly prolonged in group F (12.80 \pm 5.32) as compared with group A (8.37 \pm 3.9) (P<0.001) (Table 3, Figure 2)

The difference between both the groups regarding the straight leg raise test post operatively (Table 4, Figure 3) statistically significant (P<0.05). The patients of group F had more quadriceps muscle weakness as compare to group A.

DISCUSSION:

Post-operative pain in lower limb surgeries can delay rehabilitation and ambulation. Hence striking a balance of optimal pain control following surgery¹. The prime goal after lower limb surgeries is enabling faster recovery and reduction of the hospital stay by providing an adequate analgesia with motor preservation. To achieve this purpose, femoral nerve block has been used since many decades after lower limb surgeries but it leads to motor weakness.⁴

Recently after the development of the ultrasonography, saphenous nerve (a branch of femoral nerve) within the adductor canal has been described.^{5,6}

Jenstrup et al. demonstrated effectiveness of the ACB on pain and ambulation after TKA compared with placebo and they used high doses of local anaesthetic (30 ml of 0.75% ropivacaine). These doses lead to quadriceps weakness¹⁴. In our study we used a lower concentration of local anaesthetic (0.5% ropivacaine 30 ml) and compared femoral nerve block with adductor canal block. This dose don't lead to quadriceps weakness

A study conducted by P.Jaeger et al concluded that there was no significant difference between FNB and ACB groups regarding pain at rest⁸ similar finding was there in our study i.e. no significant difference was observed among both the groups regarding pain at rest .In a study conducted by Dong CC et al concluded that there was no significant difference in VAS score with rest or mobilization at 24 hour among FNB and ACB groups^{13,14}. Similar finding was there in our study i.e. no significant difference was found in both the groups regarding VAS score .

A study conducted by Kampitak et al concluded that the first postoperative analgesia was significantly longer in ACB block compared to groupL¹³ similar to our study i.e. statistically significant among the groups regarding first postoperative rescue analgesia .

In a study conducted by P Jager et al concluded that quadriceps strength was significantly higher in the ACB group compared with the FNB group⁸ similar finding was there in our study i.e. statistically significant among the groups regarding straight leg raise test.

In our study we concluded that quadriceps muscle weakness is more in group F as compare to group A by conducting straight leg raise test post operatively which coincide with many other studies used different instruments and scales (berg balance scale, dynamometer) concluded that quadriceps strength is weaker in FNB group as compare to ACB group¹⁰

Tables And Figures

Table 1: Demographic Variables

GROUP		Weight (Kg.)	Height (cm.)	Age (yrs.)
Group A	No. of patients	30	30	30
	Mean	64.03	166.92	30.76
	Std. Deviation	8.78	9.68	10.41
Group F	No. of patients	30	30	30
	Mean	67.1	169.03	33.63
	Std. Deviation	11.59	9.51	12.29
P-Value		0.25	0.39	0.33

Table 2 : VAS pain score

Time (hr)	Group A		Group F		P value
	Mean	SD	Mean	SD	
2 hrs	2	0.802	2	0.0	1
4 hrs	2.97	1.11	2.37	0.718	0.59
6 hrs	3.48	1.2	3.03	1.29	0.24
8 hrs	4.17	1.77	3.40	1.070	0.070
10 hrs	4.03	1.26	3.93	1.337	0.945
12 hrs	4.2	1.3	3.60	0.932	0.08
14 hrs	3.8	1.02	3.40	0.498	0.054
16 hrs	3.8	1.2	3.67	0.922	0.836
18 hrs	3.3	0.67	4.13	1.408	0.02
22 hrs	3.5	1.05	3.80	1.12	0.54
24 hrs	3.2	0.59	3.20	0.484	0.92

Table 3 : TIME OF FIRST RESCUE ANALGESIA

Group	N	Mean	SD	P value
A	29	8.37	3.90	<0.001
F	30	12.80	5.32	

Table 4: Comparison of Straight Leg Raise Test Post Operatively

Time interval	Grade	GROUPS				P value
		A		F		
		No	%	No	%	
2 HRS	GRADE 0	0	0.00	0	0	<0.001
	GRADE 1	27	93.10	0	0	

	GRADE 2	2	6.90	30	100	
4HRS	GRADE 0	0	0.00	0	0	<0.001
	GRADE 1	29	100.00	8	26.67	
	GRADE 2	0	0.00	22	73.33	
6 HRS	GRADE 0	15	51.72	5	16.67	<0.001
	GRADE 1	14	48.28	25	83.33	
	GRADE 2	0	0.00	0	0	
8 Hrs	GRADE 0	24	82.76	15	50	<0.001
	GRADE 1	5	17.24	15	50	
	GRADE 2	0	0.00	0	0	
10 Hrs	GRADE 0	29	100.00	25	83.33	0.0005
	GRADE 1	0	0.00	5	16.67	
	GRADE 2	0	0.00	0	0	
12 HRS	GRADE 0	29	100.00	28	93.33	0.13
	GRADE 1	0	0.00	2	6.67	
	GRADE 2	0	0.00	0	0	
14 HRS	GRADE 0	29	100	30	100	NA
	GRADE 1	0	0.00	0	0	
	GRADE 2	0	0.00	0	0	
16 HRS	GRADE 0	29	100	30	100	NA
	GRADE 1	0	0.00	0	0	
	GRADE 2	0	0.00	0	0	
18 HRS	GRADE 0	29	100	30	100	NA
	GRADE 1	0	0.00	0	0	
	GRADE 2	0	0.00	0	0	
22 HRS	GRADE 0	29	100.00	30	100	NA
	GRADE 1	0	0.00	0	0	
	GRADE 2	0	0.00	0	0	
24HRS	GRADE 0	29	100.00	30	100	NA
	GRADE 1	0	0.00	0	0	
	GRADE 2	0	0.00	0	0	

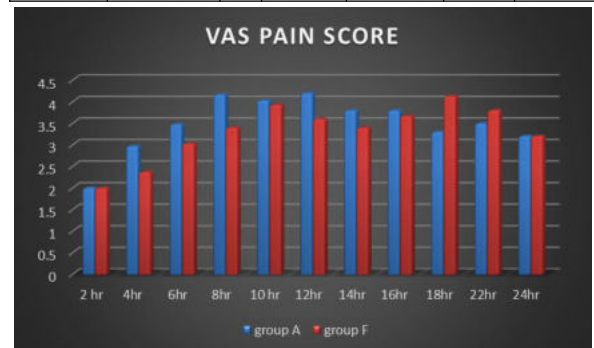


Figure 1: Vas Pain Score

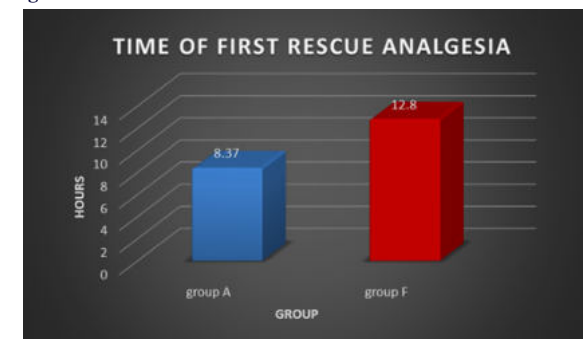


Figure 2: Time Of First Rescue Analgesia

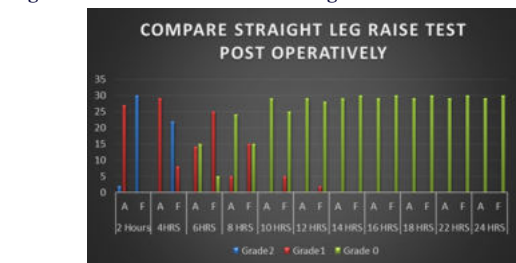


Figure 3 : Compare Straight Leg Raise Test Post Operatively

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