

Comparison of Genicular Nerve Block with Adductor Canal Block for Postoperative Pain Management in Adults undergoing Arthroscopic Anterior Cruciate Ligament Reconstruction

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INTRODUCTION

- Genicular Nerve Block (GNB): early ambulation & faster patient discharge, since it selectively blocks articular branches & is motor-sparing
- Compare analgesic efficacy of ultrasound (US) guided GNB with US-guided Adductor Canal Block (ACB) in patients undergoing Arthroscopic Anterior Cruciate Ligament Reconstruction (AACL R)

METHODS

- Randomized, double-blind study: 38 ASA I/II adults undergoing AACL R
- In OR, subarachnoid block administered in sitting position at L3-L4 intervertebral space using a 25-gauge Quincke spinal needle with 10-15 mg (2 - 3 ml) of hyperbaric bupivacaine (0.5%) and 10µg fentanyl
- After positioning supine, peripheral nerve blocks administered as per group allocation
- Group GNB (n=19): US-guided GNB with 3 ml of 0.25% bupivacaine & 2 mg dexamethasone in proximity to each of 3 nerves: superior lateral, superior medial, & inferior medial genicular nerves (Figure 1)
- Group ACB (n=19): US-guided ACB with 20 ml of 0.25% bupivacaine and 6 mg dexamethasone
- Postoperative rescue analgesia provided by IV PCA pump. Pump settings: morphine 1 mg/ml; bolus dose: 1 ml, lockout interval 10 min & maximum dose 5 mg/h
- Time from block administration to first pressing of PCA button: time to rescue analgesia
- Primary outcome: Numerical Rating Scale (NRS) pain scores over 24 h
- Secondary outcomes: duration of analgesia & 24 h morphine consumption
- Categorical variables presented as frequency & proportion. Continuous variables presented as mean ± standard deviation or median (IQR). Chi square test was used to test statistical significance of cross tabulation between categorical variables. Independent t-test or Mann-Whitney U test was used to compare continuous variables between two groups.

RESULTS

- NRS scores at rest & physical activity at 24 h were similar in both groups (p=0.429 and p=0.101 respectively)
- Mean time (SD) to rescue analgesia was similar in both groups; Group GNB: 820.79 (483.65) min [95% CI: (603.31, 1038.27 min)]; Group ACB: 858.95 (460.06) min [95% CI: (652.08,1065.82 min)]; mean difference [95% Confidence Interval (CI)]: 38.16 ([-272.42, 348.74 min]); p=0.805
- Mean (SD) 24 h morphine consumption was also similar in both groups; Group GNB: 2.47 (2.12) mg [95% CI: (1.52, 3.42 mg)]; Group ACB: 2.47 (1.93) mg [95% CI: (1.6, 3.34 mg)]; mean difference [95% CI: 0.00 (-1.33, 1.33 mg)]; p=1.000

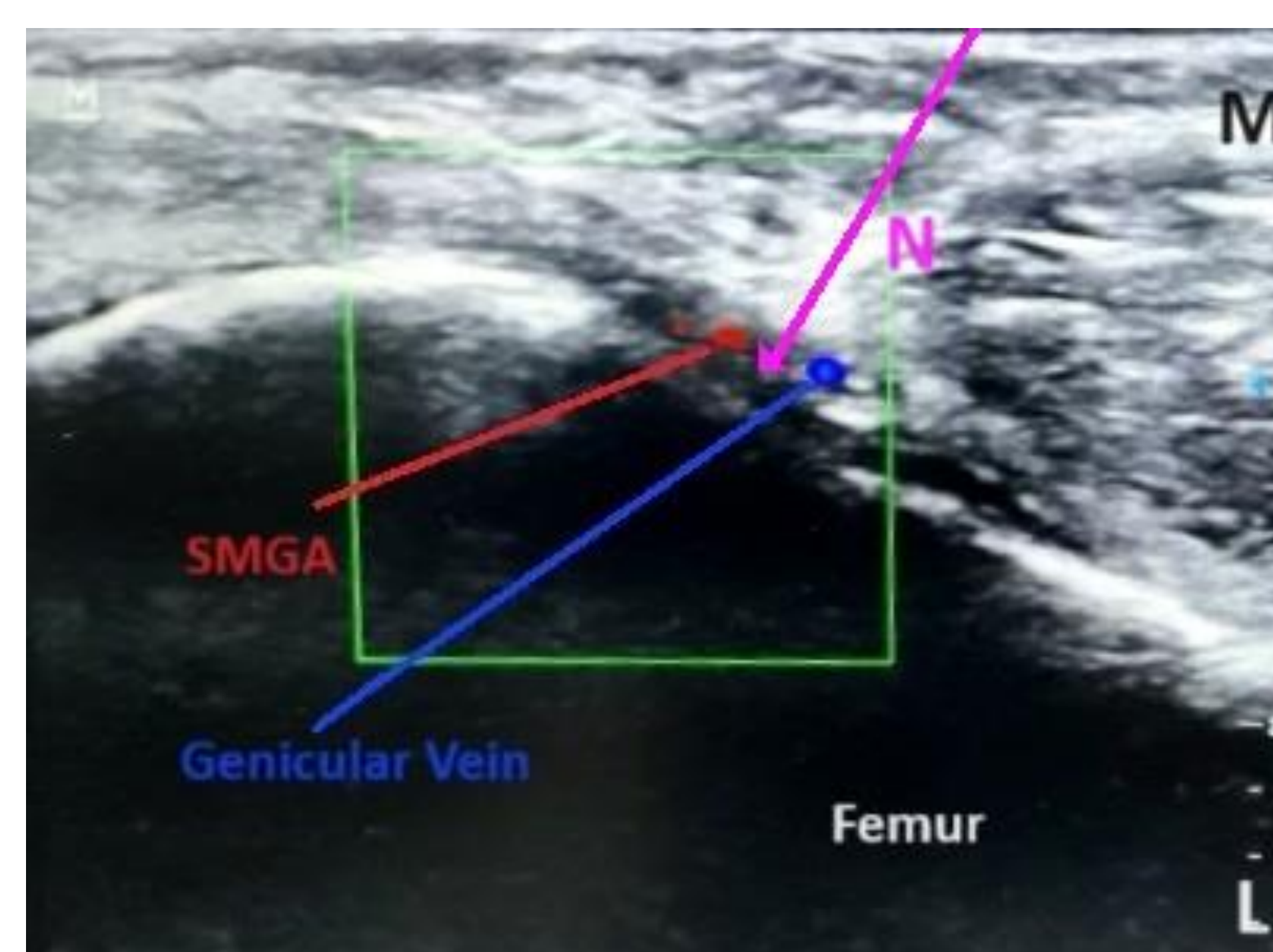


Figure 1: Site of drug injection in Superior Medial Genicular nerve block

*SMGA- Superior Medial Genicular Artery, M-Medial, L-Lateral, N-Needle

Time Point (h)	Group ACB (n=19)	Group GNB (n=19)	Effect size, r (95% CI)	P-value
NRS scores (rest)				
0 h	0(0,0)	0(0,0)	-	1.000
2 h	0(0,0)	0(0,0)	-	1.000
4 h	0(0,0)	0(0,0)	-	1.000
6 h	0(0,0)	0(0,0)	0.077 (0.005,0.36)	0.673
8 h	2(0,4)	2(0,4)	0.02 (0.006,0.38)	0.806
12 h	1(0,3)	1(0,2)	0.005 (0.005,0.39)	0.964
24 h	2(1,2)	1(1,2)	0.226 (0.03,0.54)	0.429
NRS scores (physical activity)				
0 h	0(0,0)	0(0,0)	-	1.000
2 h	0(0,0)	0(0,0)	-	1.000
4 h	0(0,0)	0(0,0)	-	1.000
6 h	0(0,0)	0(0,0)	0.077 (0.005,0.36)	0.637
8 h	2(0,4)	2(0,4)	0.02 (0.006,0.38)	0.902
12 h	2(0,3)	2(1,2)	0.005 (0.005,0.39)	0.976
24 h	2(1,2)	1(1,2)	0.226 (0.03,0.54)	0.101

Table 1: Comparison of NRS scores during rest between the groups.

Data expressed as median (IQR); h=hour, IQR = Interquartile Range, CI = Confidence Interval, ACB = Adductor Canal Block, GNB =Genicular Nerve Block, NRS= Numerical Rating Scale

Time point (h)	Morphine consumption(mg),Mean (SD)				Mean Difference (95% CI)	P-value
	Group ACB(n=19)		Group GNB(n=19)			
		(95% CI)		(95% CI)		
0 h	0.00(0.00)	-	0.00(0.00)	-	-	1.0
2 h	0.00(0.00)	-	0.00(0.00)	-	-	1.0
4 h	0.00(0.00)	-	0.00(0.00)	-	-	1.0
6 h	0.16(0.69)	(-0.15,0.47)	0.11(0.46)	(-0.1,0.32)	0.05 (-0.33, 0.44)	0.78
8 h	0.68(1.38)	(0.06,2.14)	0.95(1.31)	(0.36,1.54)	-0.26 (-1.15, 0.62)	0.55
12 h	1.37(1.71)	(0.6,2.14)	1.26(1.48)	(0.59,1.93)	0.11 (-0.95, 1.16)	0.84
24 h	2.47(1.93)	(1.6,3.34)	2.47(2.12)	(1.52,3.42)	0.00 (-1.33, 1.33)	1.0

Table 2: Comparison of morphine consumption between the groups

Data expressed as mean (SD); h=hour, SD = Standard Deviation, CI = Confidence Interval, ACB = Adductor Canal Block, GNB =Genicular Nerve Block, n=number of patients

DISCUSSION

- NRS scores & postoperative opioid requirements were similar in patients receiving either ACB or GNB
- Although, time to first rescue analgesia was lower in GNB group (820.79 min), compared to ACB group (858 min), it was statistically non-significant
- Nerve supply to knee joint involves a complex interplay between various branches of obturator, femoral and sciatic nerves
- ACB provides analgesia primarily to anterior structures of knee joint, sparing posterior capsule of knee joint
- GNB is theoretically superior as it blocks all intra-articular sensory genicular nerves supplying knee joint. This makes GNB a unique block as there is no sparing of any area of the knee joint capsule.

CONCLUSION

- US-guided GNB has an analgesic efficacy similar to US-guided ACB for patients undergoing arthroscopic ACLR.

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