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RESEARCH ARTICLE

EFFICACY OF 0.25% BUPIVACAINE AND 0.2% ROPIVACAINE IN PERICAPSULAR NERVE GROUP BLOCK IN POSITIONING FOR SPINAL ANAESTHESIA.

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Key words:- Anterior Inferior Iliac Spine (AIIS), Iliopubic Eminence (IPE), Femoral Artery (FA), and Psoas Tendon (arrows indicating articular branches).

Abstract

Hip fractures are common among the elderly due to age-related osteoporosis and degenerative changes. Effective analgesia is crucial for facilitating patient positioning for spinal anaesthesia and ensuring perioperative comfort. The Pericapsular Nerve Group (PENG) block is a promising regional anaesthetic technique that targets the articular branches of the hip joint, providing effective analgesia

Methods: A total of 60 patients were randomly allocated into two groups: Group B received 20 ml of 0.25% Bupivacaine and Group R received 20 ml of 0.2% Ropivacaine. The PENG block was performed under ultrasound guidance using a low-frequency curvilinear probe and a 22G, 120 mm needle. Visual Analogue Scale (VAS) scores at rest and during movement were assessed 10 minutes after block administration and during positioning for spinal anaesthesia. Postoperative pain was evaluated at 10, 30, and 60 minutes, then hourly for 6 hours, every 2 hours for the next 6 hours, and every 4 hours up to 24hours post-procedure.

Results: The PENG block effectively provided analgesia in both groups. Most patients experienced good pain relief preoperatively and postoperatively. However, Group R (Ropivacaine) demonstrated lower mean VAS scores and longer duration of analgesia compared to Group B (Bupivacaine), indicating superior analgesic efficacy.

Conclusion: The PENG block is an effective method for achieving preoperative and postoperative analgesia in elderly patients undergoing hip fracture surgery. Ropivacaine (0.2%) provides superior pain control and a longer duration of analgesia than Bupivacaine (0.25%), making it a more effective choice in this clinical context.

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1. Jadon A, et al. Indian J Anaesth. 2014;58:705–8.
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Introduction:-

Hip fractures are common in the elderly due to age-related osteoporosis and degenerative changes. Conventional blocks like Femoral Nerve Block and Fascia Iliaca Block offer moderate analgesia, often sparing the obturator nerve. The Pericapsular Nerve Group (PENG) block, an ultrasound-guided technique, targets the articular branches of the femoral, obturator, and accessory obturator nerves.Beyond analgesia for hip surgeries, PENG block has been employed for surgical anaesthesia in procedures like hip reduction and varicose vein stripping

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Objective of the Study:

To compare the efficacy of 0.25% Bupivacaine and 0.2% Ropivacaine in Pericapsular Nerve Group (PENG) Block for facilitating patient positioning during spinal anaesthesia and for providing perioperative analgesia.

Material and Method:

Institutional Ethical Committee Approval.
Study design: Prospective randomized control study
Study period: January 2023 to April 2024
Place of study: Mahadevappa Rampure medical College,Kalaburagi
Sample size: 30 in each group

Inclusion criteria:

1.Age range between 18-65years of either sex.
2.ASA-1 and ASA -2
3.Elective unilateral surgeries in and around Hip joint.

Exclusion criteria:

1.Patient refusal for the procedure
2.Patient with pre-existing significant systemic diseases.
3.Patient with psychiatric history.
4.Patient allergic to amide local anaesthetics.
5.Infection of the skin at the injection
6.Patients with significant coagulopathies and other contraindications for regional anaesthesia.

Methodology:

After obtaining institutional ethical clearance and written informed consent, patients scheduled for hip fracture surgery were randomly allocated into two groups using a computer-generated randomisation sequence via RALOC software. Group B received 20 mL of 0.25% Bupivacaine, and Group R received 20 mL of 0.2% Ropivacaine for the Pericapsular Nerve Group (PENG) block.

All patients underwent a pre-anaesthetic evaluation, and nil per oral (NPO) status was confirmed. An intravenous line was secured in the upper limb. The PENG block was administered under ultrasound guidance using a low-frequency curvilinear probe. The probe was placed parallel to the inguinal crease at the level of the anterior superior iliac spine and gradually moved caudally. Once the anterior inferior iliac spine was visualised, the probe was angled medially to identify the superior pubic ramus and the psoas tendon.

A 22G, 120 mm insulated Sonoplex needle was inserted in-plane until it contacted the iliopubic eminence. After negative aspiration, 20 mL of the study drug was administered beneath the psoas tendon, and adequate spread was confirmed.

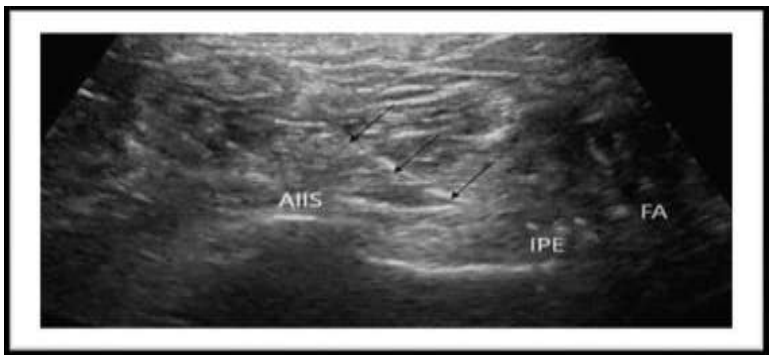


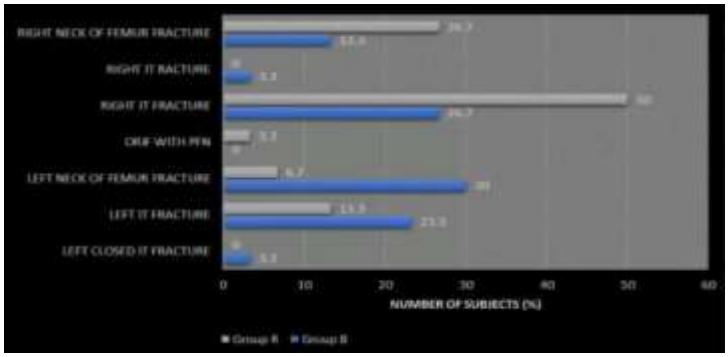
Figure: Ultrasound Anatomy for Pericapsular Nerve Group (PENG) Block.Drug is placed between iliopsoas tendon and IPE.

Visual Analogue Scale (VAS) scores were recorded at rest and during active movement before the block, ten minutes after block administration, and during positioning for spinal anaesthesia. Postoperative analgesic efficacy was assessed at 10, 30, and 60 minutes, then hourly for the first 6 hours, every 2 hours for the next 6 hours, and every 4 hours until 24 hours post-block.

Duration of analgesia is defined as a period from time of administration of test drug to the first demand for pain relief (VAS> 4).Quality of analgesia:Excellent-VAS 0;Good-VAS 1-3;Average-VAS 4-7;Poor-VAS 7-10

Statistical analysis:P value of < 0.05 was considered statistically significant.Analysis was done using SPSS Statistics 27.0.1.0.

Bar diagram showing distribution according to diagnosis between Group B and Group R



Distribution according to Surgical procedure between Group B and Group R

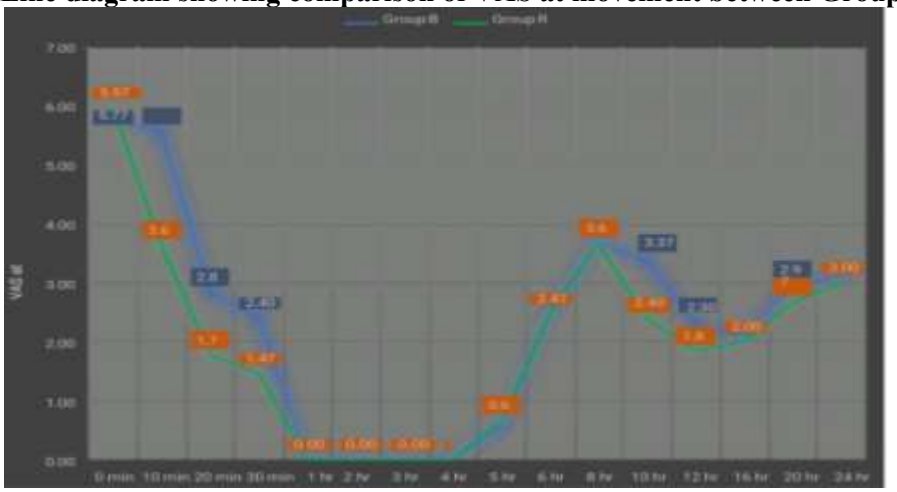
		Group B		Group R		Total	p
		No	%	No	%		
Surgical Procedure	BIPOLAR HEMIARTHROPLASTY	3	10.0	8	26.7	11	0.023
	CRIF WITHPFN	16	53.3	18	60.0	34	
	HEMIARTHROPLASTY	6	20.0	0	0.0	6	
	LEFT HEMIARTHROPLASTY	3	10.0	0	0.0	3	
	ORIF WITH DHS	1	3.3	0	0.0	1	
	ORIF WITHPFN	0	0.0	2	6.7	2	
	RIGHT HEMIARTHROPLASTY	1	3.3	2	6.7	3	
Total		30	100.0	30	100.0	60	

Comparison of pre block VAS between Group B and Group R

	Group	N	Mean	Std. Deviation	t	p	Inference
At rest	Group B	30	4.97	1.50	-0.175	0.862 (>0.05)	Not significant
	Group R	30	5.03	1.45			
At movement	Group B	30	5.83	1.74	-0.813	0.420 (>0.05)	Not significant
	Group R	30	6.17	1.42			

Line diagram showing comparison of VAS at rest between Group B and Group R

Line diagram showing comparison of VAS at movement between Group B and Group R



Comparison of mean duration of rescue analgesia between Group B and Group R

	Group	N	Mean	Std. Deviation	t	p	Inference
Duration for rescue analgesia	Group B	30	8.03	2.19	-2.669	0.010 (<0.01)	Highly significant
	Group R	30	9.87	3.06			

Comparison of duration of analgesia between Group B and Group R

	Group	N	Mean	Std. Deviation	t	p	Inference
Duration of analgesia	Group B	30	8.03	2.19	-2.669	0.010 (<0.01)	Highly significant
	Group R	30	9.87	3.06			

Conclusion:

The study demonstrated that 0.2% Ropivacaine in the Pericapsular Nerve Group (PENG) block provides significantly better analgesia than 0.25% Bupivacaine. Group R had a longer mean duration of analgesia (525.33 ± 34.23 minutes) compared to Group B which had a duration of 412.83 ± 27.84 minutes. The mean VAS scores at rest and during movement were significantly lower in Group R at all observed time points, particularly during patient positioning for spinal anaesthesia. Additionally, the number of patients requiring rescue analgesia was lower in Group R (5 patients) versus Group B (12 patients), indicating superior and prolonged analgesic effectiveness of Ropivacaine in PENG block for hip fracture surgeries.

Limitations of the Study:

1. Limited availability of ultrasound machines and the technical challenges associated with the use of a curvilinear probe may hinder the widespread application of the PENG block.
2. Further cadaveric and dye injection studies are necessary to accurately delineate the spread of local anaesthetic. Additionally, larger randomized controlled trials are required to validate the efficacy and safety of the technique.
3. Although rare, the potential risk of nerve injury cannot be completely ruled out and warrants cautious administration.

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