

Comparison of supra-inguinal fascia iliaca versus pericapsular nerve block for ease of positioning during spinal anaesthesia: A randomised double-blinded trial

Address for correspondence:

Dr. Ashok Jadon,
Duplex-63, Vijaya Heritage
phase-6, Marine Drive, Kadma,
Jamshedpur - 831 005,
Jharkhand, India.
E-mail: jadona@rediffmail.com

Submitted: 14-May-2021

Revised: 09-Aug-2021

Accepted: 10-Aug-2021

Published: 25-Aug-2021

Ashok Jadon, Khalid Mohsin, Rajendra K Sahoo¹, Swastika Chakraborty, Neelam Sinha, Apoorva Bakshi

Department of Anaesthesia and Pain Relief Service, Tata Motors Hospital, Telco Colony, Jamshedpur, Jharkhand, ¹Department of Pain and Palliative Care Medicine and Anaesthesiology, Kalinga Institute of Medical Sciences, KIIT Deemed University, Bhubaneswar, Odisha, India

ABSTRACT

Background and Aims: Regional analgesic techniques such as supra-inguinal fascia-iliaca compartment block (S-FICB) and pericapsular nerve group (PENG) block have been found to be effective in providing good pain relief in hip-fracture patients. However, comparative studies between PENG and S-FICB are lacking. The aim of this study was to compare the analgesic efficacy of S-FICB and PENG block and assess their efficacy in optimal patient positioning for spinal anaesthesia. **Methods:** A prospective randomised double-blind study was conducted in 66 patients randomly divided to receive either S-FICB or PENG block under ultrasound guidance. Primary outcome measures were numerical rating scale (NRS) pain score at rest and on passive 15° limb lifting, 30 minutes after the block and ease of spinal positioning. The secondary outcome measures were NRS over 24 hours, amount of tramadol used (number of rescue doses), patients' satisfaction and block-related complications. The results were analysed using statistical software (MedCalc version 19.2.1). Continuous and categorical data were analysed using appropriate statistical analysis and $P < 0.05$ was considered significant. **Results:** Post-block, the NRS score decreased significantly in PENG and S-FICB groups at rest and movement ($P < 0.0001$). The EOSP score was significantly better in PENG group ($P < 0.0001$). First analgesic request and pain relief in the first 24-hour period were similar between the groups ($P = 0.524$). **Conclusion:** PENG block provided better pain relief and ease of posing during SA in patients with fractured hip scheduled for hip surgery.

Key words: Anaesthesia, fascia, femoral nerve, hip fractures, nerve block, pain management, spinal

Access this article online

Website: www.ijaweb.org

DOI: 10.4103/ija.ija_417_21

Quick response code



INTRODUCTION

Severe pain associated with fractured hip often results in difficulty during positioning for spinal anaesthesia (SA).^[1] Among many regional analgesic techniques, the fascia-iliaca compartment block (FICB) is popular among anaesthesiologists to provide immediate as well as postoperative analgesia in hip fractures.^[2] Recently, the pericapsular nerve group (PENG) block has been proposed to provide effective analgesia in hip-fracture patients.^[3-5] However, comparative studies between PENG and

FICB are lacking. Therefore, we decided to conduct a prospective randomised double-blind study comparing

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Jadon A, Mohsin K, Sahoo RK, Chakraborty S, Sinha N, Bakshi A. Comparison of supra-inguinal fascia iliaca versus pericapsular nerve block for ease of positioning during spinal anaesthesia: A randomised double-blinded trial. *Indian J Anaesth* 2021;65:572-8.

ultrasound-guided supra-inguinal FICB (S-FICB) and PENG block in fractured hip patients. The objectives were to compare the immediate and postoperative analgesic efficacy of S-FICB and PENG block. The hypothesis was that PENG block will provide superior analgesia and thus ease of positioning during SA.

METHODS

This study was conducted from May 2019 to January 2021 at a tertiary academic hospital. The permission to conduct this study was taken from the hospital ethical committee and the study was also registered with the Clinical Trial Registry - India. Informed written consent was taken and patients who gave the consent to participate in the study were included.

All the patients of 40 years and above with hip fracture (not older than 2 weeks) with persistent pain and scheduled for surgery under SA with an expected duration of 2.5 hours were included in this study.

The exclusion criteria were patient's refusal to participate, any contraindications to SA or peripheral nerve blocks, history of ischaemic heart disease, patients on opioids for chronic pain and patients with significant cognitive impairment. Patients who had surgery on the hip or spine within 3 months or had no pain while sitting by themselves (resting pain less than 4 on NRS) for SA without any support were also excluded.

A total of 66 patients were randomly divided into two equal groups:

- (1) S-FICB (n = 33, patients who received ultrasound-guided supra-inguinal fascia iliaca block)
- (2) PENG (n = 33, patients who received ultrasound-guided pericapsular nerve group block).

Computer-generated random numbers and group assignment was done by sequentially numbered opaque envelopes. The envelope was opened just before the procedure by the anaesthesiologist performing the block. The observer (another anaesthesiologist) and patients were unaware of the group and procedure performed.

Patients were taken to the operating room and standard monitors such as electrocardiogram, non-invasive blood pressure and pulse oximetry were attached.

Pre-procedure pain was assessed during rest as well as on movement (15° passive elevation) of the affected limb and recorded on numeric pain rating scale (NRS) [0 = no pain; 10 = worst imaginable pain]. The blocks were performed in supine position and strict sterile technique was followed. Both the blocks were performed as per the standard technique described earlier [Figure 1a-e].^[3,6,7]

After the block, patients were continuously monitored by non-invasive blood pressure every 5 minutes, continuous ECG and pulse oximetry and for signs of local anaesthetic toxicity for 30 minutes.

Thirty minutes after the blocks, analgesia was measured by NRS at rest and on passive limb elevation. It was decided that, if any patient had NRS >5, intravenous (IV) fentanyl 20 µg will be given every 5 minutes till NRS score became 3, and then, they will be allowed for sitting position for SA. The ease of spinal positioning (EOSP) was assessed on the scale of 0–3 (0 = unable to position, 1 = patient had abnormal posturing due to pain and required support for positioning, 2 = mild discomfort but does not

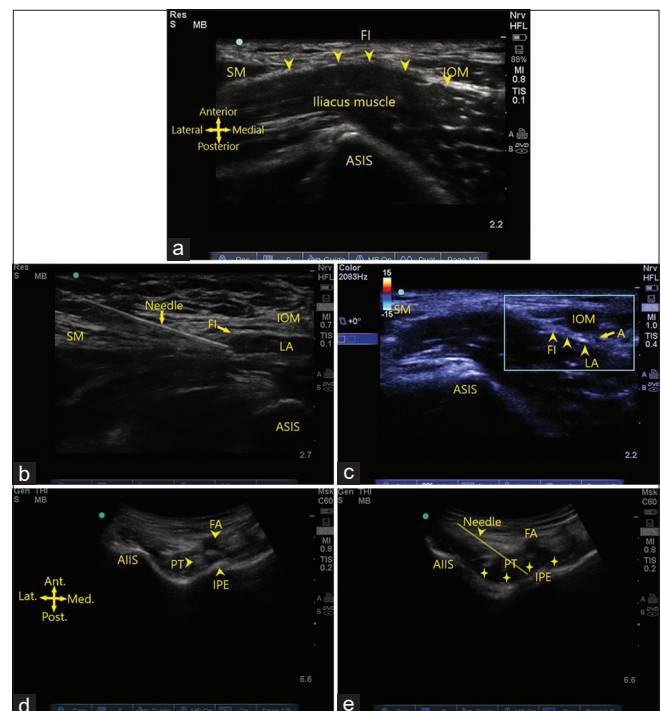


Figure 1: (a) Sonoanatomy of S-FICB; (b) spread of local anaesthetic below the fascia iliaca; (c) deep circumflex iliac artery just above the fascia iliaca; (d) Sonoanatomy of PENG block, *showing local anaesthetic spread; (e) trajectory of needle and local anaesthetic spread between psoas tendon and pubic ramus. ASIS- anterior superior iliac spine, AIIS- anterior inferior iliac spine, A- deep circumflex iliac artery, FA- femoral artery, FI-fascia iliaca, IOM-internal oblique muscle, IPE-ilio-pectineal eminence, SM-sartorius muscle, PT-psoas tendon

require support for positioning, 3 = optimal condition where the patient was able to position himself without pain). The amount of fentanyl used, NRS scores and scores for EOSP were recorded. All observations were done by another anaesthesiologist who was unaware of the regional block performed. Under strict aseptic precaution, SA was given with 1.8-ml bupivacaine (heavy) 0.5% and 0.4-ml fentanyl (20 µg) using a 26-gauge pencil-point needle. An infusion of dexmedetomidine (0.2–0.7 µg/kg/h) was used for sedation during surgery. No additional analgesia was used in the intraoperative period except 1-gm IV paracetamol at the end of the surgery. Postoperative analgesia was provided with IV paracetamol 1 gm every 8 h. The rescue analgesia was provided with 50 mg tramadol on demand or when NRS was >4.^[8] All patients were followed up postoperatively at 4, 6, 8, 12 and 24 hours.

Primary outcome measures were NRS at rest and on passive 15° limb lifting, 30 minutes after the block and EOSP. The secondary outcome measures were NRS over 24 hours, amount of tramadol used (number of rescue doses), patients' satisfaction and block-related complications.

The sample size was calculated based on the study of 20 patients where the EOSP score (mean ± SD) was 2.65 ± 0.67.^[5] To detect the clinically significant difference in EOSP score of 0.5 between the means of two groups at 95% confidence interval and 80% power, 56 patients were required at $P < 0.05$. To consider >10% attrition, 66 patients were finally included in the study. The formula used in the study was as follows: $k = n_2/n_1 = 1$, $n_1 = (\sigma_1^2 + \sigma_2^2/K)(z_{1-\alpha/2} + z_{1-\beta})^2/\Delta^2$, $n_1 = (0.67^2 + 0.67^2/1)(1.96 + 0.84)^2/0.5^2$, $n_1 = 28$, $n_2 = K \times n_1 = 28$ in each group.

$\Delta = [\mu_2 - \mu_1]$ = absolute difference between two means; σ_1, σ_2 = variance of means; n_1 = sample size of group 1; n_2 = sample size of group 2; α = probability of type-1 error (0.05); β = probability of type-2 error (0.2); z = critical Z value for a given α or β ; k = ratio of sample size for group 2 to group 1.

The results were analysed using the statistical software (MedCalc version 19.2.1.). Continuous data were assessed for normality using the Kolmogorov–Smirnov test of normality. Normally distributed data represented as mean ± standard deviation (SD) was assessed using the student's *t*-test (two-tailed, unequal variances), and non-normally

distributed data [represented as median (range)] was assessed using the Mann–Whitney U-test. Ordinal data were represented as median and interquartile range (IQR), and assessed using the Mann–Whitney U-test. The time to first analgesic request was assessed using the log-rank (Mantel–Cox) test. Chi-square statistic was used for categorical data. $P < 0.05$ was considered significant. The effect size was calculated either with Cohen's D or Glass's delta depending upon the values of standard deviation (SD) variability.

RESULTS

A total of 70 patients were enrolled; however, 66 patients were finally included in the study [Figure 2]. The demographic variables were comparable between the two groups [Table 1]. The pre-block NRS in both the groups were comparable at rest and on movement ($P = 0.214$ and 0.872 , respectively) [Table 2]. Thirty minutes post-block, the NRS score decreased significantly in PENG group mean (IQR), 6 (1) and 9 (1.5) to 3 (2) and 4 (1) and, in S-FICB group 5 (1.5) and 8 (1) to 4 (1) and 5 (1) at rest and movement, respectively ($P < 0.0001$). The mean ± SD (95% CI) EOSP score in the S-FICB group was 1.39 ± 0.49 (1.22–1.55) and in the PENG group 2.15 ± 0.6 (95% CI, 1.94–2.35; $P < 0.0001$) [Table 3]. The mean ± SD doses of rescue analgesics (tramadol) were 1.3 ± 0.8 in the S-FICB group and 1.6 ± 0.86 in the PENG group ($P = 0.146$) [Table 3]. Time to first analgesic request (in hours) mean ± SD (95% CI) was 11.8 ± 0.84 (10.21–13.54) and 11.21 ± 0.70 (9.83–12.59) in the S-FICB and PENG

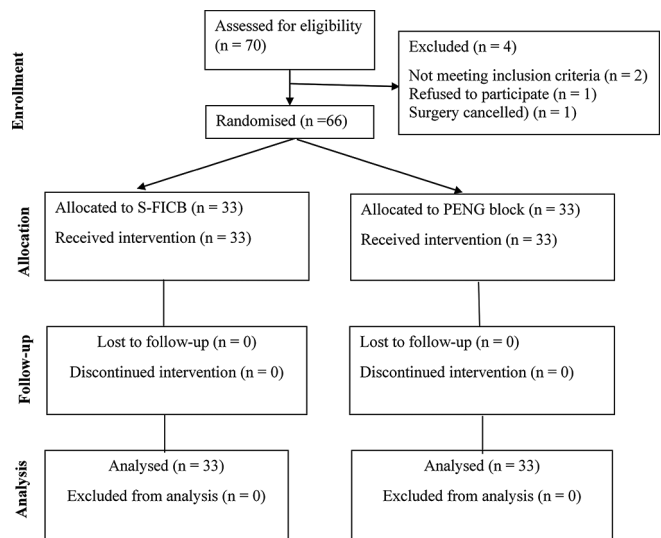


Figure 2: CONSORT flow diagram for enrolment, group allocation, follow-up and analysis

Table 1: Demographic variables, site of fractures and co-morbidities in both the groups

Variable	S-FICB (n=33)	PENG (n=33)	P*
Age (years)	67.87±13.12	70.39±11.45	0.41†
Male/Female (numbers)	14/19	13/20	0.80‡
ASA 1/2/3	5/24/4	5/23/5	0.76‡
Site of Fracture (numbers): IT/IC/ST	24/7/2	21/12/0	0.39‡
Height (cm)	155.4±8.39	154.92±10.14	0.811†
Weight (kg)	70.98±8.23	71.78±6.24	0.605†
BMI (kg/m ²)	29.5±3.67	30.15±3.76	0.409†
Co-morbidities:			
HT/DM/HT + DM/HT + HPT/HT + DM + HPT	6/3/13/8/3	6/7/13/4/3	0.56‡

Data is represented as either the number of patients or as mean±SD. *P>0.05 (Not significant), †student t-Test, ‡Chi-Square test, ASA - American Society of Anesthesiologists, IC - Intra Capsular, IT - Inter-trochanteric, ST - Sub-Trochanteric, SD - Standard deviation, S-FICB - Supra-inguinal fascia iliaca compartment block, PENG - Pericapsular nerve group, HT - Hypertension, DM - Diabetes Mellitus, HPT-Hypothyroidism

Table 2: Comparison of pre-block and 30 min post-block NRS in the S-FICB and PENG group patients

Group	Pre-block NRS Median (IQR)		Post-block NRS Median (IQR)	
	Rest	Movement	Rest	Movement
S-FICB (n=33)	5 (1.5)	8 (1)	4 (1)	5 (1)
PENG (n=33)	6 (1)	9 (1.5)	3 (2)	4 (1)
P	0.214	0.872	0.000*	0.004*

Data is represented as median (IQR). *P<0.05 (significant) Mann-Whitney's U-test, NRS - Numeric rating scale, IQR - Interquartile range, S-FICB - supra-inguinal fascia iliaca compartment block, PENG - Pericapsular nerve group

groups, respectively ($P = 0.524$) [Table 3]. The median (IQR) NRS scores were assessed and recorded at rest and on movement at 4, 6, 12 and 24 hours in both the groups [Table 4]. In both the groups, 3% of patients were dissatisfied and 97% were highly satisfied or satisfied ($P = 0.897$). No patient needed any additional fentanyl boluses in both the groups. None of the patients reported any block-related complications.

DISCUSSION

In this study, both S-FICB and PENG block provided a significant reduction in NRS pain scores. However, immediate reduction in NRS pain scores was significantly better in the PENG block compared to FICB at rest. The better pain control possibly contributed to significantly higher EOSP scores in the PENG block. The pain scores at various time points were comparable in both the groups except, at 12 hours where NRS was lower in the PENG group at rest and higher at 24 hours during movement compared to the FICB group.

SA is preferred for surgery in hip fracture cases that are often elderly with additional medical co-morbidities.^[9,10] Optimal sitting position is one of the prerequisites for smooth conduct of SA as the majority of hip-fracture patients experience severe

pain and benefit from regional blocks.^[1,11-13] Currently, FICB and PENG block are two commonly used regional techniques to provide analgesia during spinal positioning and for postoperative pain relief. Both the PENG and FICB techniques provide effective analgesia for patient positioning but the majority of the data from the PENG block are in the form of case series.^[4,5,14-16] Similarly, S-FICB is a relatively new approach and comparative data is insufficient to draw any conclusion. The claimed advantage of FICB is that it is considered a 3-in-1 block involving femoral nerve (FN), lateral femoral cutaneous nerve (LFCN) and obturator nerve (ON). However, the results were inconsistent due to either variability in the volume of local anaesthetic or the technique of FICB. Shariat *et al.*^[17] reported no significant difference in postoperative pain score and 24-hour opioid consumption between FICB with 0.5% ropivacaine and sham block with 0.9% normal saline in THA. In their study, the proximal spreading of local anaesthetic (LA) was not achieved because the infra-inguinal technique and transverse plane were used rather than the longitudinal plane.^[18,19] Supra-inguinal technique (S-FICB) blocks the three nerves more consistently than the infra-inguinal approach.^[20] Kumar *et al.*^[21] observed that S-FICB has a superior postoperative analgesic efficacy compared to infra-inguinal approach of FICB along with significantly less morphine consumption in the first 24 hours.

The FICB is a compartmental block and high volumes of LA (40–60 ml) have been used for successful block in infra-inguinal approach.^[22] However, the studies on the S-FICB approach have offered differing opinions about the effective/ideal volume. One cadaveric study of S-FICB based on computed tomography (CT) scan and dissection findings suggested that 40 ml of injectate can reach the FN, ON, and LFCN.^[23] Other clinical studies have suggested that effective block can be

Table 3: Comparison of EOSP, doses and time to first request of rescue analgesic in S-FICB and PENG group patients

EOSP score, Mean±SD (95% CI)			
S-FICB (n=33)	PENG (n=33)	P	Glass's δ
1.39±0.49 (1.22-1.53)	2.15±0.6 (1.94-2.35)	<0.0001*	1.55 [†]
Number of doses of rescue analgesic (Tramadol) in 24 h, Mean±SD			
1.3±0.8	1.6±0.86	0.146	0.36 [‡]
Time to first analgesic request (in hours) Mean±SD (95% CI)			
11.8±0.84 (10.21-13.54)	11.21±0.70 (9.83-12.59)	0.524 (Log-Rank, Mantel-Cox test)	

Data is represented as mean (±SD) (95% CI), * Glass's δ - effect size calculation, *P<0.05 (significant) Student's t-test, [†](High effect size), [‡](low effect size), EOSP - ease of spinal positioning, SD - Standard deviation, CI - Confidence interval, S-FICB - supra-inguinal fascia iliaca compartment block, PENG - Pericapsular nerve group

Table 4: Comparison of NRS in the S-FICB and PENG group patients at various time points

Time points	S-FICB (n=33)	PENG (n=33)	P
NRS (at Rest) Median (IQR)			
4 h	0 (1)	0 (1)	0.764
6 h	1 (2)	1 (2)	0.952
12 h	3 (2)	2 (1)	0.046*
24 h	2 (1)	2 (2)	0.067
NRS (on movement) Median (IQR)			
4 h	1 (2)	1 (1)	0.078
6 h	1 (2)	1 (2)	0.477
12 h	3 (1.5)	4 (0)	0.58
24 h	2 (1)	3 (1.5)	0.000*

Data is represented as median (IQR). *P<0.05 (significant) Mann-Whitney's U-test, NRS - Numeric rating scale, IQR - Interquartile range, S-FICB - supra-inguinal fascia iliaca compartment block, PENG - Pericapsular nerve group

achieved with lower volumes. Yamada *et al.*^[24] studied the minimum effective volume of LA in S-FICB. They found that the EV50 and EV95 of 0.25% ropivacaine for S-FICB were 15.01 ml and 26.99 ml, respectively. Bhattacharya *et al.*^[25] compared S-FICB and PENG block by using 20 ml of 0.25% levobupivacaine in both the groups and found it to be effective. We used a 25-ml mixture of 0.25% bupivacaine and dexamethasone (8 mg) in both the groups and found it clinically effective as no patient required an additional dose of fentanyl and all the patients had a significant reduction in the NRS after block.

The PENG block is a recently described regional analgesic technique that targets the articular branches to the anterior hip joint with a single injection based on the cadaveric study that showed a significant contribution of the accessory obturator nerve (in addition to femoral and obturator nerves) towards anterior hip joint innervations. Hence, it is supposed to be motor sparing and that is the major difference from FICB. Following the initial description of PENG block, there have been a significant number of publications of case reports and case series highlighting the excellent analgesic benefit for perioperative analgesia in hip surgery.^[3-5,14-16,26,27] The initially suggested technique was an in-plane technique; however, out-of-plane

and landmark-based techniques have also been suggested.^[28] Very few studies comparing PENG block with FICB or similar other regional analgesia techniques have been published in the literature.

In a randomised comparative study by Bhattacharya *et al.*,^[25] 50 patients with fractured neck of femur received either PENG or S-FICB. The PENG group had a significantly quicker onset of action (signified by a reduction of pain score by 5) compared to the S-FICB group (average of 13.6 and 22 minutes, respectively). The average duration of action was almost similar between the two groups (9.9 hours in PENG and 10.32 hours in the S-FICB group).^[25] We did not focus on the onset of block; rather, we observed the pain relief after 30 minutes expecting the complete action as observed by other studies. In our study, the duration of analgesia was assessed by the time to first analgesic request. The duration was not significantly different between the S-FICB and PENG groups (the mean in FICB was 11.8 hours and 11.21 hours in PENG) ($P = 0.524$). In another double-blinded randomised comparative study by Shankar *et al.*,^[14] the duration of block was comparable between the FICB and PENG (7.85 and 8.16 hours, respectively).

As far as reduction in the pain score after PENG block is concerned, most of the studies have found a mean reduction of 5–7 in the NRS pain scores.^[3-5] We also observed a similar reduction in NRS scores at rest as well as on movement. The reduction of the NRS in the PENG block group was significantly more than the S-FICB. During positioning for SA, patients of the PENG group were significantly more comfortable than S-FICB. The mean EOSP score in the FICB group was 1.39 and in the PENG block group, it was 2.15, which was similar to previously reported studies.^[4,13]

The patients' satisfaction about pain relief after the blocks was assessed by a feedback questionnaire before discharge and their response was recorded as dissatisfied, satisfied or highly satisfied. In both the

groups, 3% of patients were dissatisfied and 97% were highly satisfied or satisfied. Our results were similar to other studies that have reported high satisfaction with PENG block^[4,5,29] as well as FICB.^[30] No patient reported any LA toxicity or block-related complication.

We observed that in patients with hip fracture scheduled for open surgery, PENG block provided significantly superior analgesia than S-FICB 30 minutes after the block and during positioning for SA. The NRS scores at rest and on movement were comparable except at 12 and 24 hours. The duration of analgesia, the doses of rescue analgesic (tramadol) and patient's satisfaction were comparable.

This study has few limitations. First, the use of patient-controlled analgesia would have been better to get an idea of 24-hour opioids consumption than the request for demand analgesia. However, this was compensated by keeping patients in high-dependency units following surgery with adequate nursing support. Second, assessment of motor functions in the postoperative period would have given us an idea of whether PENG block is truly motor sparing. Finally, whether an additional LFCN block in the PENG group would have made any difference in the NRS pain scores postoperatively needs further study.^[29] We observed that PENG block was an effective and safe technique and provided better pain relief and better sitting comfort during SA than S-FICB.

CONCLUSION

To conclude, PENG block provided better pain relief and ease of positing during SA in patients with fractured hip scheduled for hip surgery.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Fettes PDW, Jansson J-R, Wildsmith JAW. Failed spinal anaesthesia: Mechanisms, management, and prevention. *Br J Anaesth* 2009;102:739-48.
2. Kumar D, Hooda S, Kiran S, Devi J. Analgesic efficacy of ultrasound guided FICB in patients with hip fracture. *J Clin Diagn Res* 2016;10:13-6.
3. Giron-Arango L, Peng PWH, Chin KJ, Brull R, Perlas A. Pericapsular nerve group (PENG) block for hip fracture. *Reg Anesth Pain Med* 2018;43:859-63.
4. Sahoo RK, Jadon A, Sharma SK, Peng PW. Peri-capsular nerve group block provides excellent analgesia in hip fractures and positioning for spinal anaesthesia: A prospective cohort study. *Indian J Anaesth* 2020;64:898-900.
5. Brown B, Lin D-Y, Saies A, Vermeulen M, Kroon HM, Doornberg J, *et al.* The pericapsular nerve group block for hip fracture surgery: A prospective case series. *J Anesth Clin Res* 2021;12:999.
6. Hebbard P, Ivanusic J, Sha S. Ultrasound-guided supra-inguinal fascia iliaca block: A cadaveric evaluation of a novel approach. *Anaesthesia* 2011;66:300-5.
7. Desmet M, Vermeylen K, Van Herreweghe I, Carlier L, Soetens F, Lambrecht S, *et al.* A longitudinal supra-inguinal fascia iliaca compartment block reduces morphine consumption after total hip arthroplasty. *Reg Anesth Pain Med* 2017;42:327-33.
8. Li X, Yu L, Yang J, Tan H. Multimodal an-algesia with ropivacaine wound infiltration and intravenous flurbiprofen axetil provides enhanced analgesic effects after radical thyroidectomy: A randomized controlled trial. *BMC Anesthesiol* 2019;19:167.
9. Van Waesberghe J, Stevanovic A, Rossaint R, Coburn M. General vs. neuraxial anaesthesia in hip fracture patients: A systematic review and meta-analysis. *BMC Anesthesiol* 2017;17:87.
10. Kowark A, Rossaint R, Coburn M. General versus spinal anesthesia for the elderly hip fractured patient. *Curr Opin Anaesthesiol* 2019;32:116-9.
11. Durrani HD, Butt KJ, Khosa AH, Umer A, Pervaiz M. Pain relief during positioning for spinal anesthesia in patients with femoral fracture: A comparison between femoral nerve block and intravenous nalbuphine. *Pak J Med Health Sci* 2013;7:928-32.
12. Amin NH, West JA, Farmer T, Basmajian HG. Nerve blocks in the geriatric patient with hip fracture: A review of the current literature and relevant neuroanatomy. *Geriatr Orthop Surg Rehabil* 2017;8:268-75.
13. Scurrah A, Shiner CT, Stevens JA, Faux SG. Regional nerve blockade for early analgesic management of elderly patients with hip fracture – A narrative review. *Anaesthesia* 2018;73:769-83.
14. Shankar K, Srinivasan R, Ashwin AB, Nandini U, Chandra M, Kadlimatti DV. Comparative study of ultrasound guided PENG [Pericapsular Nerve Group] block and FIB [Fascia Iliaca Block] for positioning and postoperative analgesia prior to spinal anaesthesia for hip surgeries: Prospective randomised comparative clinical study. *Indian J Anesth Analg* 2020;7:798-803.
15. Mosaffa F, Esmaelijah A, Khoshnevis H. Analgesia before performing a spinal block in the lateral decubitus position in patients with femoral neck fracture: A comparison between fascia iliaca block and IV fentanyl. *Reg Anesth Pain Med* 2005;30:61.
16. Ueshima H, Otake H. Clinical experiences of pericapsular nerve group (PENG) block for hip surgeries. *J Clin Anesth* 2018;51:60-1.
17. Shariat AN, Hadzic A, Xu D, Shastri U, Kwofie K, Gandhi K, *et al.* Fascia iliaca block for analgesia after hip arthroplasty:

- A randomised double-blind, placebo-controlled trial. *Reg Anesth Pain Med* 2013;38:201-5.
18. Vaughan B, Manley M, Stewart D, Iyer V. Distal injection site may explain lack of analgesia from fascia iliaca block for total hip. *Reg Anesth Pain Med* 2013;38:556-7.
 19. Murgatroyd H, Forero M, Chin KJ. The efficacy of ultrasound-guided fascia iliaca block in hip surgery: A question of technique? *Reg Anesth Pain Med* 2013;38:459-60.
 20. Vermeylen K, Desmet M, Leunen I, Soetens F, Neyrinck A, Carens D, *et al.* Supra-inguinal injection for fascia iliaca compartment block results in more consistent spread towards the lumbar plexus than an infra-inguinal injection: A volunteer study. *Reg Anesth Pain Med* 2019;rapm-2018-100092. doi: 10.1136/rapm-2018-100092.
 21. Kumar K, Pandey RK, Bhalla AP, Kashyap L, Garg R, Darlong V, *et al.* Comparison of conventional infrainguinal versus modified proximal suprainguinal approach of Fascia Iliaca Compartment Block for postoperative analgesia in Total Hip Arthroplasty. A prospective randomised study. *Acta Anaesthesiol Belg* 2015;66:95-100.
 22. Dulaney-Cripe E, Hadaway S, Bauman R, Trame C, Smith C, Sillaman B, *et al.* A continuous infusion fascia iliaca compartment block in hip fracture patients: A pilot study. *J Clin Med Res* 2012;4:45-8.
 23. Vermeylen K, Soetens F, Leunen I, Hadzic A, Van Boxtael S, Pomes J, *et al.* The effect of the volume of supra-inguinal injected solution on the spread of the injectate under the fascia iliaca: A preliminary study. *J Anesth* 2018;32:908-13.
 24. Yamada K, Inomata S, Saito S. Minimum effective volume of ropivacaine for ultrasound-guided supra-inguinal fascia iliaca compartment block. *Sci Rep* 2020;10:21859.
 25. Bhattacharya A, Bhatti T, Halder M. Pericapsular nerve group block – Is it better than the rest for pain relief in fracture neck of femur? *Reg Anesth Pain Med* 2019;44:A116.
 26. Acharya U, Lamsal R. Pericapsular nerve group block: An excellent option for analgesia for positional pain in hip fractures. *Case Rep Anesthesiol* 2020;2020:1830136.
 27. Morrison C, Brown B, Lin DY, Jaarsma R, Kroon H. Analgesia and anesthesia using the pericapsular nerve group block in hip surgery and hip fracture: A scoping review. *Reg Anesth Pain Med* 2021;46:169-75.
 28. Jadon A, Sinha N, Chakraborty S, Singh B, Agrawal A. Pericapsular nerve group (PENG) block: A feasibility study of landmark based technique. *Indian J Anaesth* 2020;64:710-3.
 29. Sandri M, Blasi A, De Blasi RA. PENG block and LIA as a possible anesthesia technique for total hip arthroplasty. *J Anesth* 2020;34:472-5.
 30. Liang Y, Lv L, He L, Deng W, Chen C, Li J. A Randomised controlled trial of FNB versus FICB for patients with femoral neck fractures before spinal anesthesia. *Clin Interv Aging* 2020;15:1113-9.



**“ANAESTHESIA A COMPLETE SPECIALITY- WE ARE THE LIFELINE”
AND OUR LIFELINE IS
“ISA FAMILY BENEVOLENT FUND”**

- ISA encourages members to join Family Benevolent Fund of Indian Society of Anaesthesiologists (ISA-FBF) to help our colleagues’ and our own families when they face the testing moments of their life.
- BECOME AN ISAFBF MEMBER, NOT FOR YOU, BUT TO HELP OUR COLLEAGUE’S FAMILIES BY DONATING Rs.300/- per year /death.
- TO BECOME AN ISAFBF MEMBER KINDLY VISIT OUR WEBSITE isafbf.com or CONTACT YOUR CITY BRANCH/STATE/PRESIDENT/SECRETARY
- **Contact for Details & Application forms:**
Dr. Sugu Varghese, Hon.Sec.ISA-FBF
Mobile: +91-9447052094
Website: www.isafbf.com/www.isaweb.in
(Or Contact: Your State/City branch President/Secretary)