International Journal of Life Sciences, Biotechnology and Pharma Research Vol. 14, No. 2, February 2025 Online ISSN: 2250-3137
Print ISSN: 2977-0122

DOI: 10.69605/ijlbpr_14.2.2025.85

ORIGINAL RESEARCH

A Comparative Study Between Bupivacaine Plain Versus Bupivacaine Plain and Dexmedetomidine in Fascia Iliaca Compartment Block to Provide Analgesia for Positioning Femur Fracture Patients Before Spinal Anaesthesia

Dr. Arti R. Rathod[1], Dr. Sonali A. Joshi[2], Dr. Dhwani A. Chaudhari[3]

[1]Senior Resident, Department of Anesthesia, JIS School of Medical Science & Research, West Bengal, India
[2]Associate Professor, Department of Anesthesia, Surat Municipal Institute of Medical Education & Research, Surat, Gujarat, India
[3]Assistant Professor, Department of Anesthesia, NAMO Medical Education & Research Institute, Silvassa, India

Corresponding author
Dr. Arti R. Rathod
Senior Resident, Department of Anesthesia, JIS School of Medical Science & Research, West Bengal, India

Received: 11 January, 2025 Accepted: 28 January, 2025 Published: 17 February, 2025

ABSTRACT

Background and Aim: Patients with femur fractures need a simple, easily accessible regional nerve block that can be performed supine without patient movement. Quadratus lumborum, femoral nerve, and fascia iliaca compartment blocks are the main methods. Dexmedetomidine will be tested in a fascia iliaca compartment block to position femur fracture patients before spinal anesthesia. **Material and Methods:** This study compared the analgesic effects of Bupivacaine plain and Dexmedetomidine in Fascia iliaca compartment block before spinal anesthesia in fracture femur surgery patients. Patients were split into two groups: Group A patents (n=37): 40 ml, 0.25% inj. Plain and injected Bupivacaine. In FICB, progressive injections of 1µg/kg body weight dexmedetomidine were given after a negative aspiration test. Group B patents (n=37): 40 ml, 0.25% inj. Bupivacaine plain was progressively infused after a negative FICB aspiration test. Fentanyl total, onset time to sensory block, number of patients requiring IV Fentanyl. Requirement, Start with rescue analgesia. Total rescue analgesia needed in 24 hours and baseline, positional, and postoperative VAS values were recorded. **Results:** The mean onset time to sensory block (min) was 13.29 ± 2.05 in Group A and 17.83 ± 1.04 in Group B. (P <0.001) Group A had a mean Fentanyl need of 34µg, while Group B had 38µg (P > 0.05). There was no significant difference in Mean EOSP Score between Group A (2.32 ± 0.47) and Group B (1.86 ± 0.54). (P > 0.05) Group A had a substantially longer time to first analgesic request (8.02 ± 1.21) than Group B (5.27±0.65). (P < 0.001). **Conclusion:** Dexmedetomidine (1µg/kg) to 0.25% Bupivacaine improves FICB onset and reduces discomfort during spinal anesthesia for elective orthopaedic procedures.

Key Words: Bupivacaine, Dexmedetomidine, Fentanyl, VAS score

INTRODUCTION

Patients with hip fractures experienced excruciating pain as the femur periosteum has the lowest pain threshold of the deep somatic structures.[1,2,3]

Poor pain management in femur fracture patients may lead to a physiological stress response which may cause tachycardia, hypertension and arrhythmias (may harm elderly and cardiac patients), deep venous thrombosis resulting from venous stasis, impaired immune system which results in increased infections, postoperative fatigue and delay in the return of muscle function. Therefore, it is important to treat and manage complaints of pain adequately during acute treatment for hip fractures. [1]

According to the timing of the intervention, pain management is divided into three categories. Preoperative pain management has been achieved using systemic analgesia, lower limb traction and

DOI: 10.69605/ijlbpr_14.2.2025.85

nerve blocks. Intra-operative pain management has been achieved with neuraxial anaesthesia and systemic analgesia in association with general anaesthesia. Postoperative pain management is usually accomplished by interventions including systemic analgesia, nerve blocks, Non-pharmacological methods like physical therapy, and transcutaneous electrical nerve stimulation (TENS).[4]

Systemic analgesics like opioids are commonly used, but their side effect profile includes respiratory depression, hypotension, cognitive impairment, nausea, vomiting, constipation, urinary retention, itching and others which limits their clinical utility. Conventional pain treatment (NSAIDs) is also associated with undesirable side effects like gastrointestinal haemorrhage and altered renal function.[5]

Regional analgesic techniques such as a Paravertebral block, Fascia iliaca compartment block (FICB), Peripheral nerve block; Femoral nerve block (FNB), Sciatic nerve block and Epidural analgesia have been advocated to improve the positioning of the patient. Regional anaesthesia offers advantages such as excellent muscle relaxation for orthopaedic surgeons and total obtundation of the surgical stress response.[2]

Fascia iliaca compartment block (FICB) was initially described by Delanson in 1989. It is an anterior approach of the lumbar plexus. FICB is a low-concentration, high-volume local anaesthetic nerve block, which was administered in the fascia iliaca compartment which comprises three nerves the femoral nerve, obturator nerve, and lateral femoral cutaneous nerve of the high.[6]

Advantages of FICB include the requirement of low-skilled personnel, inexpensive, and can easily be administered using anatomical landmarks to provide perioperative analgesia. This procedure can be carried out during prehospital care, emergency department, pre-operative setting and post-operative period as there is no requirement for PNS or USG machine.[7]

Various drugs like opioids, nonopioids and α2 agonists such as Clonidine and Dexmedetomidine can be used as adjuvants to local anaesthetic to improve the quality of perioperative analgesia and to prolong local anaesthetic effects.[2] Dexmedetomidine is 8 times more specific for α2 receptors than Clonidine and the improved specificity for the α2 adrenoreceptors, especially for the 2A subtype may make it to be much more effective than Clonidine.

Considering all this, we designed this prospective study to evaluate the efficacy of Dexmedetomidine in Fascia iliaca compartment block for Positioning Femur Fracture Patients before Spinal Anaesthesia.

MATERIAL AND METHODS

After approval from Institutional Ethical Committee, this study was conducted to compare the analgesic effect provided by Bupivacaine plain versus Bupivacaine plain and Dexmedetomidine in Fascia iliaca compartment block prior to positioning for spinal anaesthesia in patient undergoing surgery for fracture femur.

Inclusion Criteria

- Patients of either sex between the age Group 18 to 65 years.
- ASA (American society of anaesthesiologist): Grade I or II or III
- Patients with fracture of femur, posted for surgery under subarachnoid block.
- Patients who gave written or informed consent.

Exclusion Criteria

- Refusal of the patient to spinal anaesthesia.
- Impaired renal or hepatic function.
- Multiple traumas.
- Allergy to study drugs.
- Local infection.
- Previous surgery at injection area.
- Bleeding disorders / patients on anticoagulant therapy.
- Peripheral neuropathy.
- Mental and psychiatric disorders.
- Addicts / opioid analgesic prescription within the last two hour before the operation.

Sample size (n=37 cases per each Group) is calculated by using Open EPI software considering 24 hours analgesic consumption, in Group A (Dexmedetomidine) 58.7 ±21.6 mg & Group B (Control) 74 ± 24.7mg were taken from previous study of Mohmad Abd -Allah Amin with 80% Power, 95% Confidence Interval.

The detailed history and preoperative assessment were carried out. A detailed general as well as systemic examination was done to rule out any major systemic illness. All routine investigations were carried out. All patients were explained about the procedure and visual analogue scale (VAS score) before taking informed written consent.Patients were kept NBM for 6-8 hours before surgery. In preoperative room temperature, pulse rate, blood pressure, respiratory rate, SpO2 and VAS score at rest were noted. After securing intravenous line, preloading was done with crystalloid 10-15 ml/kg i.v. slowly.

Premedication:

- Inj. Glycopyrrolate 0.2mg i.v.
- Inj. Midazolam 50mcg/kg i.v.

Patients received landmark guided FICB 20 minutes prior to positioning for spinal anaesthesia.

Group A (n=37): 40 ml, 0.25% inj. Bupivacaine plain and inj. Dexmedetomidine 1µg / kg body weight were injected incrementally after a negative aspiration test in FICB.

Group B (n=37): 40 ml, 0.25% inj. Bupivacaine plain was injected incrementally after a negative aspiration test in FICB.

DOI: 10.69605/ijlbpr_14.2.2025.85

In the operation theatre, baseline (0 min) heart rate (HR), mean arterial pressure (MAP), oxygen saturation (SpO2) and VAS score were monitored.
FICB was given using anatomical landmark technique and two-pop technique as described by Dalens et al.[1]
Hemodynamic monitoring including heart rate, blood pressure, % saturation of oxygen (Spo2) and respiratory rate was done before and during positioning. Onset time to sensory block(min), Number of patients required Fentanyl, Total Fentanyl. (µg), VAS score at baseline and during positioning, VAS score post op 2 hr, VAS score post op 3hr, VAS score post op 6 hr, VAS score post op 12 hr, VAS score post op 24 hr, Time to first analgesic request(hour), and 24 hours analgesic consumption(mg) were monitored.
If any patient in either Group reported VAS score > 4 during positioning, iv Fentanyl. 0.5 mcg/kg was given every 5 mins until the pain score decreased to ≤ 4 or maximum dose of 3 mcg/kg was given (whichever is first); if pain score ≤4 could not be achieved patients would be excluded from study. After achieving VAS ≤4, position for spinal anaesthesia was given and spinal anaesthesia was given in either the midline or paramedian approach at the L2/3 or L3/4 level, according to the anaesthesiologist's decision. Side effects like nausea, vomiting, anaphylactic reaction, bradycardia, hypotension, respiratory depression, localized hematoma and local anaesthetic toxicity were noted.

Statistical analysis

The recorded data was compiled and entered in a spreadsheet computer program (Microsoft Excel 2019) and then exported to data editor page of SPSS version 19 (SPSS Inc., Chicago, Illinois, USA). Quantitative variables were described as means and standard deviations or median and interquartile range based on their distribution. Qualitative variables were presented as count and percentages. For all tests, confidence level and level of significance were set at 95% and 5% respectively.

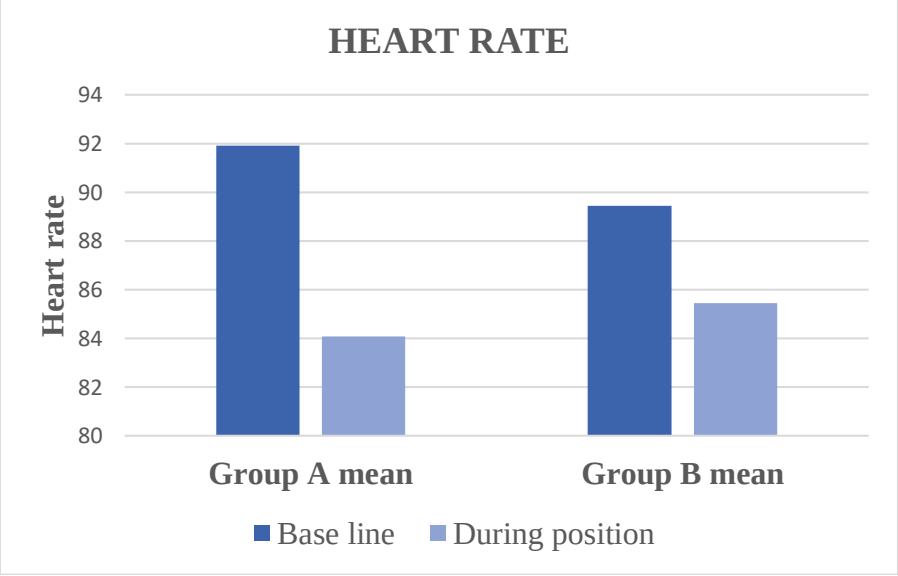
RESULTS

A prospective observational study design was used to carry out the current research. Total of 74 patients of age 18-65 years of either sex belonging to ASA class I, II and III posted for elective orthopaedic femur surgery included in this study.

Table 1: Age-Based Patient Distribution

Age	Group A	Group A%	Group B	Group B%	Total	Total%	P value
	No	%	No	%	No	%	
18-25	6	16.2	6	16.2	12	16.21	0.96
26-45	13	35.1	14	37.8	27	36.48	
46-65	18	48.64	17	45.9	35	47.29	
Total	37	100	37	100	74	100	

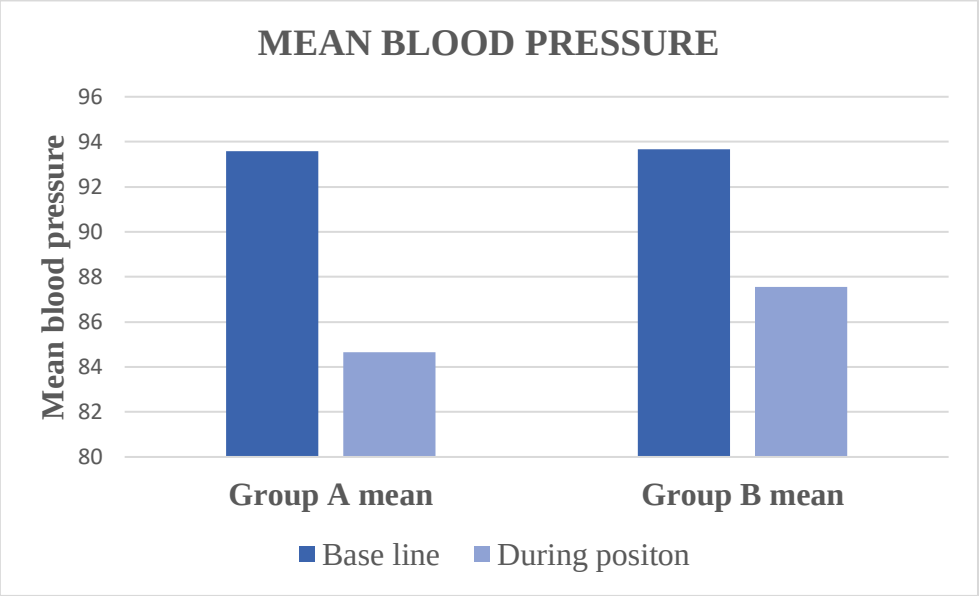
Table -1 demonstrated that the majority of patients in Groups A and B were between the ages of 46 and 65. There was no statistically significant difference in the distribution of the study population according to age Groups. (P > 0.05)
In both Groups, the number of male patients 22 (59.45%) and female patients 15 (40.54%) were equally distributed. The gender-wise distribution of the patients was comparable in both Groups. (P > 0.05)'



Graph 1: Hear Rate

DOI: 10.69605/ijlbpr_14.2.2025.85

At baseline mean heart rate in Group A was 91.9 ± 6.0 and in Group B was 89.4 ± 6.6 (P > 0.05) During positioning for spinal anaesthesia mean heart rate in Group A was 84.08 ± 5.61 and in Group B was 85.45 ± 5.86. (P > 0.05) There was reduction in heart rate in Group A as compared to Group B but the difference was not statically significant.



Graph 2: Mean blood pressure

The mean blood pressure in Group A was 93.5 ± 5.6 and in Group B was 93.6 ± 4.44 at baseline. (P > 0.05) During positioning for spinal anaesthesia mean blood pressure in Group A was 84.6± 4.26 and in Group B was 87.5 ± 4.4. (P> 0.05) Though there was fall in mean blood pressure in Group A after FICB, the difference remained insignificant. (P> 0.05) There was no statistically significant difference in oxygen saturation (SpO2) observed among both the Groups at baseline and during positioning for spinal anaesthesia. (P > 0.05)

Table 2: Onset Time to Sensory Block

Onset time to sensory block	Group A	Group B	P value
Mean	13.29	17.83	0.00004*
SD	2.05	1.04	

The mean onset time to sensory block (min) was 13.29 ± 2.05 in Group A patients and 17.83 ± 1.04 in Group B patients. As compared to Group B, Group A required lesser time for onset time to sensory block. Thus, there was highly statistically significant difference observed among both the Groups for the mean time to achieve onset to sensory block. (P <0.001)

Table 3: Total Fentanyl Requirement

Total Fentanyl. requirement	Group A	Group B	P value
Mean	34	38	0.5
SD	12.32	13.5	

Mean Fentanyl. requirement in Group A and Group B were 34µg and 38 µg respectively. There was no significant difference in regards to total Fentanyl. requirement among patients required Fentanyl. in both Groups. (P > 0.05).

Table 4: Ease of Positioning for Spinal Anaesthesia (Eosp) Score

EOSP SCORE	Group A	Group B	P value
Mean	2.32	1.86	
SD	0.47	0.54	*0.4*

Mean EOSP Score in Group A was 2.32 ± 0.47 & in Group B was 1.86 ± 0.54 Thus, there was no statistically significant difference in Mean EOSP Score observed among both the Groups. (P > 0.05)

DOI: 10.69605/ijlbpr_14.2.2025.85

Table 5: Visual Analog Score (VAS)

VAS SCORE	Group A mean	Group A SD	Group B mean	Group B SD	P value
Baseline	7.75	0.59	7.56	0.5	0.325
During Positioning	1.4	0.86	3.45	0.5	0.001
Post op 2hr	0.27	0.45	0.75	0.59	0.1
Post op 3hr	0.32	0.57	0.78	0.62	0.61
Post op 6hr	0.35	0.53	2.89	0.99	*0.0003*
Post op 12hr	3.75	0.43	5.05	0.7	*0.0043*
Post op 24hr	3.37	0.54	4.054	0.7	*0.1241*

At baseline, the mean VAS score in Group A was7.75 ± 0.59 and in Group B was 7.56 ± 0.5 Thus, there was no statistically significant difference in baseline VAS score observed among both the Groups. ($P > 0.05$) While during positioning for spinal anaesthesia, the mean VAS score of patients in Group A was 1.4 ± 0.86 and in Group B was 3.45 ± 0.5 Thus, the VAS score during positioning was better in Group A as compared to Group B and which was highly significant. ($P < 0.001$) Post op VAS Score at 6hr was 0.35 ± 0.53 in Group A and was 2.89 ± 0.99 in Group B with ($P < 0.001$). Post op VAS Score at 12hr was 3.75 ± 0.43 in Group A and was 5.05 ± 0.7 in Group B with ($P < 0.001$).

Time to first analgesic request (hours) was significantly longer in Group A (8.02 ± 1.21) as compared to Group B (5.27±0.65) thus, Dexmedetomidine delayed the first analgesic demand post operatively.In Group A (56.7 ±16.5) mg, 24hours post operative analgesic (Tramadol) requirement was significantly lower as compared to Group B (72.9 ± 28.2) mg ($P < 0.001$).Side effects like nausea, vomiting, anaphylactic reaction, bradycardia, hypotension, respiratory depression, localized hematoma and local anaesthetic toxicity were not observed in both the Group.

DISCUSSION

A femur fracture is frequently observed in young people after trauma or in the elderly after a minor fall. Anaesthesiologists have special challenges with femur fractures. These fractures are quite painful because the periosteum, which is where the pain originates, is also subjected to strong muscular stresses that can bend the thigh and further angulate the broken bone pieces, making the agony worse. Additionally, it will make it more difficult to reduce the fracture during surgery. This means that every muscle that contracts the femur must be rendered fully paralysed.[2] Bupivacaine has been used in local anaesthesia techniques in various studies, and its efficacy in different concentrations has been studied. Few studies showed that either 0.5% Bupivacaine or 0.25% Bupivacaine can provide adequate analgesia without affecting the duration significantly. However, patients receiving 0.5% Bupivacaine had lower satisfaction due to the occurrence of numbness, weakness, and delay in walking.[1,4] Here we used 0.25% Bupivacaine concentration in our study.

After local ethic committee approval and informed written consent was taken, Total 74 patients of either sex between the age Group 18 to 65 years, ASA (American society of anaesthesiologist): Grade I or II or III, Patients with fracture of femur, posted for surgery under subarachnoid block were divided into two Groups. Vital parameters and baseline VAS score were checked at recovery area and in operating area as well. FICB was performed with landmark guided technique in both Groups 20 min prior to positioning for spinal anaesthesia.

In Group A (n=37):40 ml, 0.25% Bupivacaine plain and Dexmedetomidine 1µg / kg body weight was injected incrementally after a negative aspiration test in FICB.

In Group B (n=37): Injection of 40ml ,0.25% Bupivacaine plain was injected incrementally after a negative aspiration test in FICB 20 minutes prior to positioning for spinal anaesthesia.

Both Groups were comparable in terms of all demographic aspects like mean age, mean weight, gender and ASA grading of patients.

There was reduction in blood pressure and pulse rate in Group A than Group B but not Statistically significant. ($P > 0.05$) There were no tachycardia or bradyarrhythmia or any sign of respiratory depression in any of the patients. All patients remained hemodynamically stable during procedure (FICB) and throughout operation.In 2022, Hazem El-Sayed Moawad et al,[8] found that in regard to hemodynamic changes, differences were statistically insignificant among the two Groups; Bupivacaine Group (B Group), and Bupivacaine + Dexmedetomidine (BD Group).

In our study, the mean time to sensory block (min) was 13.29 ± 2.05 in Group A patients and 17.83 ± 1.04 was in Group B patients. Thus, there was highly statistically significant difference observed among both the Groups for the mean time to achieve onset to sensory block. ($P <0.001$) In study conducted by Mohamed Abd-Allah Amin et al 2020, they noticed onset time to sensory block was significantly shorter in Dexmedetomidine Group (14.4±2.1) minutes as compared to Bupivacaine Group (17.3±2.3) minutes ($P <0.001$).[1]

There was no statistically significant difference observed in number of patients required Fentanyl. in study population. ($P > 0.05$) Mean Fentanyl. requirement in Group A and Group B was 34µg and 38 µg respectively. There was no significant

DOI: 10.69605/ijlbpr_14.2.2025.85

difference in regards to total Fentanyl. requirement among patients who required Fentanyl in both Groups. (P > 0.05) Findings of our study were in accordance with the following study:In 2021, Ashok Jadon et alcompared supra-inguinal fascia iliaca versus pericapsular nerve block for ease of positioning during spinal anaesthesia.In their study, no patients in either Group required additional dose of Fentanyl. before positioning for spinal anaesthesia.[9]

In our study, Mean EOSP Score in Group A was 2.32 ± 0.47 & in Group B was 1.86 ± 0.54 and both were comparable. (P > 0.05) Findings of our study were in accordance with the following study: In 2018, Dr Syeda et al conducted study to evaluate duration of post-operative analgesia with FICB using Bupivacaine with Dexmedetomidine and Bupivacaine with Dexamethasone in patients with proximal fracture femur. This Study result shown that percentage of quality of pain relief during positioning for spinal anaesthesia in all three Groups was similar (97%).

In our study, the mean baseline VAS score in Group A was 7.75 ± 0.59 and in Group B was 7.56 ± 0.5 Thus, there was no statistically significant difference in baseline VAS score observed among both the Groups (P > 0.05). Post op VAS Score at 6 hr in Group A was 0.35 ± 0.53 and in Group B was 2.89 ± 0.99 respectively 3.75 ± 0.43 (P < 0.001).Post operative VAS score at 6hr in Group A was 3.75 ± 0.43 and in Group B was 5.05 ± 0.7 (P < 0.001). Our study result was similar to study of Nikila Devarayasamudram et al 2018 in which VAS score was significantly higher in Group B than in Group A with P < 0.001 which was considered statistically significant.[10]In a study conducted by Sabra et al in 2020**,** they observed significant reduction in NRS score at different time interval in Group R and D as compared to Group C (P < 0.001).[1] [Group C received 40 ml normal saline; Group R received 40 ml ropivacaine 0.2% & Group D received a mixture of Dexmedetomidine 2 μg/kg + 0.2% ropivacaine with 40 ml total volume.

Time to first analgesic request (hours) was significantly longer in Group A (8.02 ± 1.21) as compared to Group B (5.27±0.65). There was statistically significant difference observed among both Groups as regard time to first analgesic requirement. (P < 0.001)In Group A, 24 hours post operative analgesic (tramadol) requirement was (56.7 ±16.5) mg which was significantly lower as compared to Group B (72.9 ± 28.2) mg (P < 0.001)As per study conducted by Suresh Kumar et al._2014 rescue analgesia (i.v. Tramadol 100 mg) was administered if post operative pain score 4 or above. The duration of post operative analgesia in hours was significantly longer in Group BD (16.33±5.69) as compared to Group (B 7.85± 1.62) (P < 0.001) Total doses of Rescue analgesics were significantly higher in Group B as compared to Group BD. (P < 0.001)

No adverse effects were observed during our study, suggesting the reliability and safety of combining Dexmedetomidine with Bupivacaine in FICB.

CONCLUSION

Present study suggests that the addition of Dexmedetomidine (1μg/kg) to 0.25 % Bupivacaine for Fascia iliaca compartment block using landmark guided technique: Decreases onset time to sensory block, prolongs duration of analgesia i.e., time for first rescue analgesia, decreases total analgesic requirement in the first 24 hours postoperatively and Reduces postoperative VAS score. Hence, Dexmedetomidine (1μg/kg) to 0.25% Bupivacaine effectively enhances the onset of FICB and decreases the severity of pain while positioning for spinal anaesthesia in patients undergoing elective orthopaedic surgeries.

REFERENCES

1. Efficacy of Adding Dexmedetomidine in Fascia iliaca compartment block to intensive care Provide Analgesia for Positioning Femur Fracture Patients before Spinal Anaesthesia Mohamed Abd-Allah Amin,1 MD; Abdalla M Abdalla,2 MD; Sabri A Soltan,2 MD Published online October 12, 2020. by Al-Azhar University, Faculty of Medicine, Cairo, Egypt.
2. Gopal ND, Krishnamurthy D. A Clinical Comparative Study of Fascia iliaca compartment block with Bupivacaine and Bupivacaine with Dexmedetomidine for Positioning and Duration of Postoperative Analgesia in Fracture Femur under Spinal Anaesthesia. Anesth Essays Res. 2018 Apr-Jun;12(2):528-534. doi: 10.4103/aer.AER_56_18. PMID: 29962629; PMCID: PMC6020591.Sana, D. S., Pathak, D. R. G., & Memon, D. N. (2018).
3. Duration of post-operative analgesia with Fascia iliaca compartment block (ficb) using Bupivacaine with Dexmedetomidine and Bupivacaine with Dexamethasone in patients with proximal fracture femur. International Journal of Medical Science and Clinical Invention, 5(1), 3477–3486. https://doi.org/10.18535/ijmsci/v5i1.23
4. Ritcey B, Pageau P, Woo MY, Perry JJ. Regional Nerve Blocks For Hip and Femoral Neck Fractures in the Emergency Department: A Systematic Review. CJEM. 2016 Jan;18(1):37-47. doi: 10.1017/cem.2015.75. Epub 2015 Sep 2. PMID: 26330019.
5. Kumar N S, N K, M R, Sebastian D, Gowda Rm P. Dexamethasone as an additive to Bupivacaine in fascia lliaca compartment block: a prospective, randomized and double blinded study. J Clin Diagn Res. 2014 Aug;8(8):GC05-8. doi: 10.7860/JCDR/2014/8754.4687. Epub 2014 Aug 20. PMID: 25302209; PMCID: PMC4190730.
6. Sandeep Diwan: Fascia Iliaca Block - an Anatomical and Technical Description Journal of Anaesthesia and Critical Care Case Reports 2015 July-Sep;1(1):27-30
7. O'Reilly N, Desmet M, Kearns R. Fascia iliaca compartment block. BJA Educ. 2019 Jun;19(6):191-197. doi: 10.1016/j.bjae.2019.03.001. Epub 2019 Apr 24. PMID: 33456890; PMCID: PMC7808109.
8. Hazem El-Sayed Moawad*, Abdel-Aziz A. Motawea, Ibrahim M. Elnemr, Mohamed A.

DOI: 10.69605/ijlbpr_14.2.2025.85

Elmorshedi:Dexmedetomidine As an Adjuvant to Bupivacaine in Ultrasound Fascia iliaca compartment block in Proximal End Femur Surgeries. The Egyptian Journal of Hospital Medicine (January 2022) Vol. 86, Page 342-349

9. Jadon, Ashok; Sinha, Neelam; Chakraborty, Swastika; Singh, Bhupendra; Agrawal, Amit. Pericapsular nerve Group (PENG) block: A feasibility study of landmark based technique. Indian Journal of Anaesthesia: August 2020 - Volume 64 - Issue 8 - p 710-713 doi: 10.4103/ija.IJA_388_20
10. Gopal ND, Krishnamurthy D. A Clinical Comparative Study of Fascia iliaca compartment block with Bupivacaine and Bupivacaine with Dexmedetomidine for Positioning and Duration of Postoperative Analgesia in Fracture Femur under Spinal Anaesthesia. Anesth Essays Res. 2018 Apr-Jun;12(2):528-534. doi: 10.4103/aer.AER_56_18. PMID: 29962629; PMCID: PMC6020591