

STUDY OF USG GUIDED FASCIA ILIACA COMPARTMENT BLOCK WITH GENERAL ANAESTHESIA FOR PROXIMAL FEMUR FRACTURE SURGERIES IN ELDERLY PATIENTS WITH COMORBIDITIES.

Anaesthesiology

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ABSTRACT

Background: Elderly patients with hip fracture have high anaesthetic risk due to their age, co-morbidities, ongoing medications like anticoagulants, antiplatelets, antihypertensives, etc. Perioperative management of these patients poses a challenge to anesthetists requiring use of multidisciplinary approach addressing the concerns of hemodynamic stability and postoperative analgesia.

Aim: To investigate Fascia Iliaca Compartment Block (FICB) with General Anaesthesia (GA) using supraglottic device (SGD) can provide adequate analgesia throughout the surgery, perioperative hemodynamic stability, post-operative analgesia and avoid postoperative complications.

Method: This prospective observational cross-sectional study was conducted after institutional review board (IRB) clearance and written informed consent of 30 patients of ASA grade II and III, undergoing elective surgery for fracture neck femur fracture. After premedicating patients with inj. Glycopyrrrolate and Midazolam, USG guided FIC block was given in supine position with high frequency linear probe using 30 ml of 0.25 % Bupivacaine with 8 mg Dexamethasone. After confirming effect of block at 20 min, patients were given general anaesthesia with inj. Propofol and proper size I-gel was placed and patients were maintained on oxygen, nitrous oxide and sevoflurane.

Result: FICB with GA using supraglottic device provides perioperative hemodynamic stability with minimal changes in mean BP and heart rate with p value < 0.05. VAS score before giving block was 9.5 ± 0.5 which decreased to 2.7 ± 0.49 at 20 mins after giving block, which was statistically significant with p value < 0.0001. Postoperative duration of analgesia was 456 ± 43.438 mins.

Conclusion: Elderly patients with fracture neck femur often have one or more co-morbidities which result in contraindication to neuraxial anaesthesia and/or GA alone. In such patients FICB with GA using SGD is a useful technique providing perioperative hemodynamic stability and satisfactory postoperative analgesia.

KEYWORDS

Elderly, high-risk patients, FICB, Hemodynamic stability

INTRODUCTION

Vast majority of hip fracture occur in patients over 65 years of age and risk increases with increasing age.

Perioperative management of these patients remains a challenge due to pain, comorbidities causing delay in surgical fixation, anticoagulant therapy causing delay in safe use of neuraxial anaesthesia.⁽¹⁾ Delirium is one of the most frequent complication during hospital stay of these patients which is attributable to use of opioid analgesics.

Timely surgical intervention with early return of ambulation can decrease rate of complications associated with immobility. Multidisciplinary approach is thus required in perioperative management of these patients.⁽¹³⁾ Neuraxial anaesthesia has its own distinct advantages over general anaesthesia for management of elderly patients with hip fracture like shorter hospital stay, less delirium and less perturbation of cardiorespiratory status.^(1,12) However, a large number of elderly patients are on antiplatelets or anticoagulants which leads to delay in surgical fixation under neuraxial anaesthesia or contraindication to the same.

Due to these challenges, an alternative anaesthetic plan is necessary addressing the concerns of perioperative hemodynamic stability, post-operative analgesia and delirium. Cochrane review has shown that performing a nerve block before, during or after surgery in patients with fracture neck femur reduces pain scores at 30 minutes and decreases opioid consumption compared to systemic analgesics and also reduces postoperative pulmonary complications.⁽¹⁷⁾

Fascia Iliaca Compartment Block (FICB) was first described by Dalens in 1989 where Local Anaesthetic solution is injected proximally beneath fascia iliaca with aim of blocking femoral,

obturator and lateral cutaneous nerve of thigh. FICB has been described for use as a pain control modality in femur fracture, hip and knee arthroplasty. Ultrasound guidance has increased the safety and efficacy of FICB. It has been used in emergency room, to facilitate positioning for neuraxial block or as a part of multimodal analgesia postoperatively.⁽¹⁴⁾ Several studies have demonstrated superior pain relief with FICB whether used preoperatively or post operatively as compared to systemic analgesics. A systematic review and meta-analysis found preoperative FICB to be superior to opioids for pain control on movement, perioperative analgesic consumption, time to first analgesic request and time to perform spinal.⁽¹⁶⁾

In this study, we aim to investigate efficacy of FICB in conjunction with GA for proximal femur fracture surgeries in elderly patients with comorbidities.

AIMS AND OBJECTIVES:

The purposes of this study are:

- (1) To investigate whether USG guided Fascia Iliaca Compartment Block in conjunction with general anaesthesia with supraglottic device without muscle relaxant can provide adequate analgesia throughout surgeries of proximal femur fixation.
- (2) To assess the perioperative hemodynamic stability using this technique
- (3) To assess early postoperative complication profile using this technique.
- (4) To assess duration of analgesia

Methodology

This study was approved by Institutional Review Board (IRB) and written informed consent was obtained from all patients.

INCLUSION CRITERIA:

- Patients aged 60-90 years
- American Society of Anesthesiologists (ASA) Physical Status 2 and 3
- Posted for elective surgery for fracture femur
- Written informed consent

EXCLUSION CRITERIA:

- Patients refusal
- Patients with psychiatric illness
- Presence of peripheral sensorineural deficit
- Allergic to local anesthetic agents
- Infection at the site of block performance

Method

Type of study: Prospective Observational cross sectional at a tertiary care hospital.

After institutional review board (IRB) clearance and written informed consent, 30 patients of ASA grade II and III undergoing elective surgery for femur fracture fixation were included in study. Preparations for giving general anesthesia, emergency resuscitation, and ultrasound equipment for the peripheral nerve block were kept ready.

After taking patient in operation theater, all monitors including ECG, SpO₂ and NIBP were applied. Baseline vitals were recorded. IV line was secured with 20G cannula. Patients were premedicated with inj. Glycopyrrolate and inj. Midazolam. The patients were maintained in the supine position, with extension of the lower limbs, and after sterilization, FICB was given by consultant by portable ultra-sound (Sonosite M Turbo). A high frequency (8-12 Hz) linear probe of portable ultra-sound (Sonosite M Turbo) was used to identify the puncture site at 1.0 cm lateral to the mid-point of pubic tubercle and anterior superior iliac spine. The ultrasound probe was placed levelly on the inguinal region, perpendicular to the long axis of leg, and scanning was done till the image showed the high-level echoes of fascia iliaca and fascia lata covered the low-level echoes of iliopsoas. Then a 20G 100 mm Stimuplex Ultra puncture needle was inserted at 45° angle to the skin and needle movement was observed on ultrasound machine. After loss of two resistance 5 ml normal saline was injected; successful positioning was indicated by the spreading of liquid along the interspace of fascia iliaca on the ultrasound image. After negative aspiration for blood, 30 ml 0.25% Bupivacaine with 8 mg Dexamethasone was slowly injected.



Figure 1: Ultrasound image of fascia iliaca at the level of inguinal ligament. Femoral nerve (FN) and Femoral artery (FA) are visualized on medial side and Sartorius muscle (SM) on lateral side.

Twenty minutes after the peripheral nerve block, patients were assessed by pin prick on anterolateral part of thigh. No loss of pinprick sensation in the anterior part of thigh within 20 min of performing the peripheral nerve block was considered as block failure. Such patients were excluded from the study.

After confirming the effect of block, patients were given general anaesthesia with inj. Propofol and proper size I-gel was placed and maintained on oxygen, nitrous oxide and sevoflurane.

Complications such as sore throat, postoperative neuropathy, postoperative agitation, hypoxemia and other pulmonary complications were noted.

Postoperative VAS score was recorded every hourly till VAS ≥ 4 ; when patients were given rescue analgesics and study was terminated. This manuscript adheres to STROBE guidelines.

Sample size calculation:

The sample size calculation is done with help of a pilot study. Sample size calculation is based on a VAS score of Baseline and 20 minutes after a block by considering the mean of two groups i.e. 9.57 and 2.69 and by considering a standard deviation of 0.50, a minimum of <6 samples per group are required to detect a difference at 80% power and 5% level of significance. So, we go for 30 patients for this study for convenience.

Statistical analysis:

All collected data were entered in IBM SPSS v20. Qualitative data expressed in percentage or frequency and quantitative data expressed as mean with its standard deviation. Student's t-test and Mann Whitney u test were used to carrying out the p-value of the difference of heart rate and vas score at different periods of time. P-value <0.05 shows a statistically significant difference.

Observation:

In our study, we used the combined technique of USG guided FICB block and general anesthesia using Supraglottic airway device for intra-operative and postoperative analgesia for 30 patients undergoing elective surgery for fracture neck femur. We did not have any failure of block cases or cases requiring conversion to endotracheal anaesthesia for any cause. Outcomes were measured as primary outcomes that includes duration of analgesia and secondary outcomes that includes intra-operative hemodynamic stability and postoperative complications.

Demographic data, ASA grade and duration of surgery were depicted in Table 1.

Table 1: Demographic Data

Data	Mean
Age	70.93 $\pm$ 10.40
Sex (M/F)	19 / 11
Weight (kg)	58.13 $\pm$ 7.49
ASA physical status (II / III)	16 / 14
Duration of surgery (minutes)	67.67 $\pm$ 7.63

Perioperative mean heart rate depicted in Table 2.

Table 2: Perioperative mean heart rate

Time	Mean Heart rate $\pm$ SD (per minute)	P value with baseline heart rate
Preoperative	86.37 $\pm$ 10.23	
At the time of block	90.80 $\pm$ 10.86	0.11
5 min after block	88.03 $\pm$ 9.50	0.52
10 min after block	86.43 $\pm$ 9.36	0.98
20 min after block	84.67 $\pm$ 9.17	0.50
At the time of induction	84.53 $\pm$ 9.61	0.47
After 5 min	82.47 $\pm$ 9.57	0.13
After 10 min	81.43 $\pm$ 9.03	0.05
After 15 min	81.57 $\pm$ 8.69	0.05
After 20 min	82.07 $\pm$ 8.94	0.09
After 25 min	82.50 $\pm$ 9.53	0.13
After 30 min	82.03 $\pm$ 8.81	0.08
After 40 min	82.10 $\pm$ 8.91	0.09
After 50 min	82.17 $\pm$ 8.83	0.09
After 60 min	83.00 $\pm$ 8.60	0.17
After 70 min	84.30 $\pm$ 10.55	0.44
After 80 min	89.75 $\pm$ 9.04	0.18

Perioperative mean MAP depicted in Table 3.

Table 3: Perioperative mean MAP

Time	Mean MAP $\pm$ SD (mm Hg)	P value with baseline MAP
Preoperative	93.18 $\pm$ 7.34	
At the time of block	96.44 $\pm$ 6.67	0.07
5 min after block	96.10 $\pm$ 5.11	0.08
10 min after block	94.87 $\pm$ 5.05	0.30

20 min after block	96.19 ± 5.46	0.07
At the time of induction	92.18 ± 4.11	0.52
After 5 min	90.31 ± 3.88	0.06
After 10 min	90.28 ± 3.85	0.06
After 15 min	90.62 ± 3.91	0.10
After 20 min	91.01 ± 4.52	0.17
After 25 min	91.23 ± 5.75	0.26
After 30 min	90.84 ± 5.67	0.17
After 40 min	91.23 ± 4.84	0.23
After 50 min	92.82 ± 4.83	0.82
After 60 min	92.87 ± 5.04	0.85
After 70 min	94.52 ± 5.25	0.42
After 80 min	96.29 ± 5.16	0.06

Table 2 and 3 shows hemodynamic parameters perioperatively. Change in Heart rate and Mean arterial pressure were statistically insignificant.

Perioperative VAS score depicted in Figure 1A.

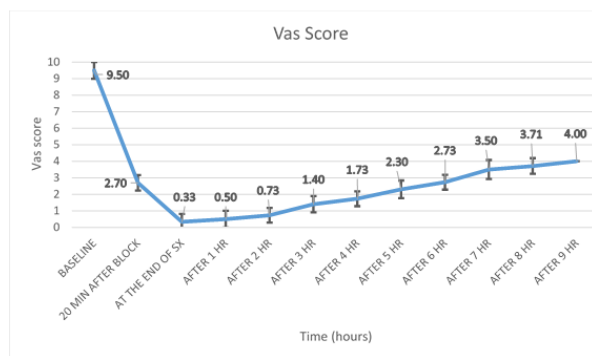


Figure 1A: perioperative VAS score

VAS score before and after giving FICB shows statistically significant difference with p value <0.001.

The mean postoperative analgesia was found to be 456 ± 43.44 min after which patients experienced pain for which analgesic were given in form of inj. PCM 1 gm iv.

Postoperative complications were shown in Table 4

Table 4: Postoperative complications

Postoperative complications	No. of patients (N = 30) (%)
Sore throat	0
Postoperative neuropathy	0
Postoperative agitation	0
Hypoxemia	0
Pulmonary complications	2 (6.66%)

DISCUSSION

Balancing appropriate medical optimization with need for early surgical intervention in elderly patients with hip fracture, poses a challenge to the anaesthetists.⁽¹⁾

Due to several co-morbidities in elderly patients with hip/neck fracture a multidisciplinary approach is required for perioperative management.

The absolute or relative contraindication to neuraxial anaesthesia leaves the anaesthetists with a dilemma to choose a technique of anaesthesia which takes care of perioperative hemodynamic stability and provides adequate postoperative analgesia without causing respiratory depression, delirium and other complications.⁽¹⁾

To address these challenges, we chose to investigate FICB with GA using supraglottic device as the anaesthetic technique to find out if we could achieve these goals. However, a small sample size is the limitation of our study. Also, we have addressed only early perioperative efficacy and safety.

The neurotoxic effects and potential for postoperative cognitive

dysfunction are the reasons for less preference of GA in elderly patients. However, use of peripheral nerve block technique permits reduction in dose of GA; causes less interference with GI function after surgery and decrease incidence of postoperative delirium.⁽⁶⁾

Nerve block for hip poses a challenge due to complex innervation as we need to block obturator, femoral, superficial gluteal and articular branches of sciatic. Hence lumbar plexus and sciatic block are the best methods to achieve analgesia. However, both being deep blocks; require technical expertise and may be contraindicated in patients on anticoagulants. The FICB blocks femoral, lateral cutaneous nerve of thigh and obturator by placing local anaesthetic under fascia iliaca; which is technically simpler. Also, the use of USG guidance allows real time guidance which improves its safety and efficacy.⁽⁶⁾

The results of our study showed that patients had minimal changes in their heart rate and mean BP throughout the surgery, with p value > 0.05 which was statistically insignificant. Insertion of supraglottic device caused minimal changes in vital parameters.

Joseph Ruzbarkasy et al in their preliminary study of the fascia iliaca block as primary intraoperative anaesthesia for hip fracture surgery, reported perioperative hemodynamic stability.⁽¹⁾

Similar findings were observed by HY Zhong, XB Deng, Z Wang in their study on FICB combined with general laryngeal mask anaesthesia in children undergoing femoral fracture surgery, they proved that FICB combined with general anaesthesia using LMA provided stable hemodynamic parameters.⁽²⁾

In our study VAS score before giving FIC block was (9.5 ± 0.5) and after giving FIC block was (2.7 ± 0.49) which is statistically highly significant with p value ≤ 0.0001.

Neena Jain, Pooja Rawal Mathur, in their study, comparative study of USG guided femoral nerve block versus FICB in patients with femur fracture for reducing pain associated with positioning shown that there is significant difference in VAS score before and after giving peripheral nerve block FICB (7.44 ± 0.5) vs (2.4 ± 0.57).⁽⁵⁾

Kumar D, Hooda S, Kiran S, Devi J, in their study on analgesic efficacy of ultrasound guided FICB in patient with hip fracture, reported similar findings. VAS score before giving FIC Block was average 7.5 which decrease to average of 2.94 after 20 min of giving block.⁽⁴⁾

Duration of analgesia in our study was 456 ± 43.44 min. and patient perception of anaesthetic technique was satisfactory. Thus, FICB reduced the overall consumption of analgesics in first 24 hours and decreased the incidence of respiratory depression.

J Steenberg and A. M. Moll demonstrated in their study on effect of FICB on hip fracture, similar findings showing postoperative analgesic effect last for at least 8 hours (480 min).⁽³⁾

Patients were observed for perioperative complications like sore throat, postoperative neuropathy, postoperative agitation, hypoxemia and other pulmonary complication. We observed postoperative pneumonia in 2 patients.

Both patients who developed pneumonia were known case of COPD. However, pneumonia was treated with IV antibiotics and chest PT.

Similar complications were noted by Joseph J Ruzbarkasy in their study on Fascia Iliaca Block as the primary intraoperative anesthesia for hip fracture surgery.⁽¹⁾

CONCLUSION

Elderly patients with fracture of neck of femur/ hip fracture often have one or more co-morbidities which result in contraindication to neuraxial anaesthesia and their age makes them a poor candidate for GA alone. In such patients FICB with GA using SGD is a useful technique providing perioperative hemodynamic stability and satisfactory postoperative analgesia.

LIMITATIONS

This study was done in relatively smaller size of population. Hence generalization to the whole population will require further research in a larger population and multicentric randomized control trials.

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