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FICB(Fascia Iliaca Compartment block) with General Anaesthesia for perioperative analgesia in Hip& femur surgeries.

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Abstract
Background:
Hip & femur surgeries are comon surgeries.Now a days multimodal analgesia concept is comon.we have explored advantage of Fascia Iliaca Compartment block with General Anaesthesia for perioperative analgesia.
Aims & Objectives
To Compare Control Group & FICB Group for
Hemodynamic parameters ,Intraoperative Fentanyl and endtidal sevoflurane requirement,Time to Attain modified Aldrete score ≥9 ,Time to First Requirement of first rescue analgesic And Total Analgesic Requests In 24hrs post operatively. ,Adverse Effects and Complications.
Study type*: Randomised controlled double blind Observational study*
Study period*: February 2019 to March 2020.*
Study place*: SVP hospital,NHLM Medical college, Ahmedabad*
Methods
This study was carried out after taking permission of Institutional review board ,& inform consent from 60 patients of ASA grade I, II, III who were scheduled for elective hip and femur surgeries under general anesthesia.
Randomisation *All patients were divided randomly into two groups by odd & even numbers in sealed opaque envelope.Execution of Randomisation at the time of giving General Anaesthesia.*
Group A: *Received General Anaesthesia only*
Group B: *Received US Guided Fascia iliaca block with 0.25% 0.3 ml/kg Bupivacaine followed by General Anaesthesia.*
In all the patients Baseline VAS & VAS at the time of induction were noted.
mean HR, SBP, DBP, MAP, in intraoperative period.
In Group B FICB was significantly more effective in providing analgesia and compare to group A.significantly decrease requirement of
Intraoperative Fentanyl Aliquots (50 mcg): in Group A (2.77±0.67) is more than Group B (0.33±0.47). p<0.001Intraoperative Mean Sevoflurane Requirement: in Group A (1.75) is more than Group B (0.56). p<0.001
Time to Reversal to Extubation: in Group A (26.20±2.97) is more than Group B (11.33±2.23).p<0.001In PACU Time to attain MAS≥9: in Group A (34.80±3.13) is more than Group B (14.7±1.86). p<0.001
Postoperative Mean VAS score: in Group A (4.67) is more than Group B (2.53). p<0.001.1st analgesic request in Group A (1.48±0.50) is more than Group B (9.06±0.90). p<0.001.Total analgesic consumption in 24 hrs: in Group A (3.53±0.50) is more than Group B (1.33±0.47). p<0.001

Keywords: *Fascia Iliaca Compartment block (FICB),Femur& Hip surgery, perioperative analgesia.*

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I. Introduction

Fracture Femur is a common orthopedic injury which causes severe pain and distress to the patient as the periosteum has the lowest pain threshold of the deep somatic structures.[8] Anaesthesia for femur surgeries is usually provided by subarachnoid block or general anaesthesia.

NSAIDs used for multimodal analgesia , even in moderate dose cause adverse effects, especially in the elderly population although opioids are potent analgesics, they are associated with serious adverse effects like drowsiness, nausea, respiratory depression, constipation etc. limiting their use[4]. Nerve blocks have come up as an effective and a safe alternative to provide pain relief

Preemptive Analgesia is an antinociceptive treatment that prevents establishment of altered processing of afferent input, which amplifies postoperative pain. Preemptive analgesia has been defined as treatment that:

It starts before surgery;Prevents the establishment of central sensitization caused by incisional injury (covers only the period of surgery;Prevents the establishment of central sensitization caused by incisional and inflammatory injuries.Fascia iliaca compartment block was initially described by Dalen's[4] on children using landmark technique. It is relatively simple, easier to perform, and provides perioperative analgesia in patients with painful conditions affecting the thigh, hip joint and femur.The FICB is low Concentration, high volume local anaesthetic nerve block administered into the fascia iliaca compartment at the inguinal region which targets the femoral, obturator and the Lateral femoral cutaneous nerves.[32]Now a days use of US in regional analgesia is getting popular as it provides injection of local anaesthetic agent at a particular site with less volume.Taking all this in consideration we decided to see efficacy of US Guided fascia iliaca compartment block on patient operated for hip surgery under general anaesthesia.

Methods

After taking written consent,60 adult patients of ASA grade I, II, III of either gender posted for various elective femur surgery at Tertiary care hospital were assessed for the inclusion and exclusion criteria and were included in the study after obtainin written informed consent.

INCLUSION CRITERIA:

All hip fracture Patients ,Identifiable potential delay in surgery,Consent from patient and relative given ,Conservatively managed patients whose pain was not well controlled

EXCLUSION CRITERIA:

Patients not satisfying inclusion criteria,Patients with hemorrhagic diathesis, neurological disorders, psychiatric disorders

Previous femoral bypass surgery ,Infection over the injection site.

Patients who decline consent

Study protocol

Through preoperative Anaesthesia checkup done, written consent was taken& VAS explained.All patients were kept Nil by Mouth at least for 6 hrs before surgery.On arrival to the operation theatre, an intravenous line was secured and IV fluid started 4-6 ml/kg/hr. pulse oximeter, non-invasive blood pressure and ECG. and baseline hemodynamic parameters & VAS recorded. BIS AND TOF Monitoring were attached .Dragger's Fabius GS work's station was prepared for cardio pulmonary resuscitation of patientAll patients were premeditated with Inj. Glycopyrrolate 0.004 mg/kg IV, Inj. Ondansetron 0.08 mg/kg IV, Inj Fentanyl 2 mcg/ml.Before induction of general anaesthesia VAS was recorded in both groups All patients were randomly allocated in 2 groups, each having thirty patients:

- GROUP A: Not received block & General anaesthesia is given.
- GROUP B: Received Fascia iliaca compartment block before induction

With Inj bupivacaine 0.25% 0.3 ml/kg by Ultrasound guided method & then general anaesthesia was given.Group FICB patients were placed in supine position. The local anaesthetic solution was prepared with Inj bupivacaine 0.25% 0.3 ml/kg. The Ultrasound Machine was powered on and the linear array probe was covered with sterile dressing after applying ultrasound gel. The probe was placed in a horizontal direction over the anterior part of thigh just below the inguinal ligament. The ultrasound setting used to visualize was at a frequency of 10 MHz and a depth of 3-4 cm. The gain and focus were adjusted according to the image scanned. Femoral artery was identified first .Then the iliacus muscle covered by fascia iliaca was identified lateral to the artery. 23G Spinal needle was then inserted in plane to the ultrasound beam. The needle was advanced until the tip of the needle was placed beneath the fascia iliaca (appreciating the give as the fascia is perforated) and after negative aspiration, the local anaesthetic was injected and its spread visualized on the ultrasound screen. We have used real-time ultrasound for visualization of local anaesthetic agent in the fascia iliaca plane.

Sensory onset of analgesia was assessed by pinprick method on antero lateral side of the thigh of operating limb. Up to 20 min after block. After confirming sensory onset & measurement of VAS general anaesthesia was given.General anaesthesia was given in both groups in following manner

All patients were pre oxygenated with 100% oxygen.

Patient was induced with Inj. Thiopentone Sodium 6 mg/kg IV and Inj. Atracurium 0.5 mg/kg IV to facilitate laryngoscopy and intubation.

All intubations were accomplished within 15 seconds of laryngoscopy.
Patient was intubated with appropriate size endotracheal tube, and kept on ventilator VCV mode, anaesthesia maintained with O2 (50%), N2O (50%), sevoflurane 1.5 MAC and then maintained with atracurium 0.1 mg/kg as a when required according to TOF monitoring. BIS was managed between 45 to 55 by extra aliquots of Inj fentanyl 50 mcg & increasing the concentration of sevoflurane 0.2%. Total intraoperative fentanyl requirement recorded for each patients.$Etco_2$ maintained within 25-35.ET sevoflurane measured periodically with vitals parameters.Vitals to be monitored were Heart rate, Systolic Blood Pressure, Diastolic Blood Pressure, Mean Arterial Pressure and SPO2 were recorded.All Vital parameters were recorded at following stages:
Base line,15 min ,30 min ,45 min ,1 hr,1.15 hr,1.30 hr. Than in post-operative ward patient 0,1,2,4,6,8,12,24 hrs
There are Certain definitions used in our study

- Tachycardia: pulse rate more than 100/min
- Bradycardia: pulse rate less than 60/min
- Hypertension: blood pressure more than 140/90 mm hg
- Hypotension: Blood pressure less than 90/60 mm hg

When tachycardia and hypertension is there we have used Inj fentanyl alliquotes of 50 mcg and increase Concentration of sevoflurane0.2% incrementally.Whenever hypotension is there it is treated with fluid and Inj mephentermine 0.6 mg. and whenever bradycardia is occurred its treated Inj atropine accordingly.Intraoperative fluid management done accordingly and keeping cardiovascular status of patient in mind
Intraoperative blood loss is corrected with Pack cell Volume and blood products. At the end of surgery, residual neuromuscular blockade was reversed with Inj. Glycopyrrolate 0.008 mg/kg IV and Inj. Neostigmine 0.05 mg/kg IV .Extubation was carried out when the patient had adequately recovered from the effect of neuromuscular blockade with regular breathing pattern, good muscle tone, power, hemodynamic stability and was able to respond to verbal commands and adequate neuromuscular monitoring parameters.In postoperative ward patient pain was measured with VAS score and vitals monitoring was done periodically.each patient in PACU is monitored and shifted to postoperative ward when modified Aldrete score ≥9.In the post-operative ward, in all patients were assessed for vitals parameters periodically.We have measured time to 1st analgesic request & total analgesic requests in 24 hrs & compared in both groups.

- Postoperative Analgesia was given when VAS ≥4, In the Form of Inj Tramadol 1 mg/kg with Ondansetron 4 Mcg/Kg.
- All patients were watched for complications of drug and procedure for 24 hrs. We follow up patients for 7 days and any transient neurological complication, post-operative delirium & agitation.

Statistical analysis was done by MS Excel Software version 2016
Data were recorded in Microsoft excel in both groups and compared with unpaired t test for numerical parameters& chisequare test for categorical variables.P value > 0.05 is considered Non significant (NS), P value < 0.05 is considered significant (S),P value < 0.001 is considered highly significant (HS)

II. Results

TABLE 1: Group Allocation

GROUP	INTERVENTION	NUMBER
A	General Anaesthesia	30
B	FICB + General Anaesthesia	30

TABLE 2 : DEMOGRAPHIC PARAMETERS

	Group A	Group B	P value
Age	59.43±18.09	67.1±11.24	0.065
Gender (M/F)	M/F = 17/13	M/F = 20/10	
Duration of surgery	74.5±13.62	73.16±11.243	0.672
ASA grading (I/II/III)	6/11/13	4/8/18	
Duration of surgery	75.9±15.55	74±12	0.250859

TABLE 3

VAS	Group A	Group B	P value
Baseline	7.27±0.82	7.23±0.77	0.860
At the time of induction	7.07±0.82	2.6±0.49	<0.001

TABLE4A END TIDAL SEVOFLURANE
Mean End tidal sevoflurane in Group A (1.75) is more than Group B (0.56). p<0.001

TABLE 4 B INTRAOPERATIVE FENTANYL REQUIREMENT

Group	Group A (Mean±SD)	Group B (Mean±SD)	P value
Intraoperative Fentanyl Requirement(no.)	2.77±0.67	0.33±0.47	<0.001

Intraoperative fentanyl aliquots in 50 mcg IV bolus is given to maintain analgesia & hemodynamic stability. P<0.001

TABLE 5 TIME TO REVERSAL TO EXTUBATION

Group	Group A (Mean±SD)	Group B (Mean±SD)	P value
TIme of reversal to Extubation	26.20±2.97	11.33±2.23	<0.001

TABLE 6:TIME TO ATTAIN MODIFIED ALDRETE SCORE >9

Group	Group A (Mean±SD)	Group B (Mean±SD)	P value
TIME TO ATTAIN MODIFIED ALDRETE SCORE >9 (MIN)	34.80±3.13	14.7±1.86	<0.001

Table 7 POSTOPERATIVE VAS SCORE

Parameter	Group A	Group B	P value
Postoperative Mean VAS	**4.67**	**2.53**	**<0.001**

TABLE 8 POST OPERATIVE ANALGESIC CHARACTRISTICS

	GROUP A (Mean±SD)	GROUP B (Mean±SD)	P VALUE
TIME TO FIRST ANALGESIC REQUEST	1.48±0.50	9.06±0.90	<0.001
TOTAL ANALGESIC REQUEST	3.53±0.50	1.33±0.47	<0.001

Post op patients were monitored for Heart rate, SBP, DBP, MAP and VAS score periodically. Post operatively patients were monitored for 24 hrs.No any complication encountered. We follow up patients for 7 days and no any transient neurological complications noticed.

III. Discussion

Patients with femur fracture requires continues pain management from the time of operation to postoperative phase. Inadequate pain control may lead to serious medical issues such as tachycardia, myocardial ischemia, and venous thromboembolism. Adequate postoperative analgesia facilitates earlier patient mobilization and satisfaction.

The FICB effectively blocks femoral and lateral cutaneous nerve of thigh, thus provides effective Intraoperative and postoperative analgesia in patients with various fractures femur. In this study we analyzed the hypothesis that USG guided FICB would provide effective Preemptive Perioperative analgesia when compared with conventional general anaesthesia technique.

Linyi Yang[43] et al ,Zhong HY46 et al,Newman B27 et al Nicolai B. Foss28Yun, M & Kim44 used FICB for analgesia.**Hao J et al[16]** Pre-emptive analgesia with continuous FICB is an effective technique to reduce Postoperative delirium in geriatric patients with hip fracture. Incidence of was lower in the experimental group (13.9% versus 35.7%, p=0.018).

METHOD OF FICB

We have used US guided method of FICB with 23G quincke spinal needle.

Dolan J[7] et al had compared anatomical landmark guided FICB (48%) with US guided FICB (82%) and concluded that US guided FICB is better than anatomical.**Vasantha Kumar J[38] et al** have used 23G quincke spinal needle for US guided FICB.

DOSE OF BUPIVACAINE

We have used inj bupivacaine 0.25% 0.3 ml/kg for FICB in group B in our study.

G. Mouzopoulos[25] et al & Godoy monzon[12] et al have used bupivacaine 0.25% 0.3 ml/kg concentration in his study for FICB as analgesic replacement.**Kumaran Rasappan[32]et al** given low concentration and high volume of local anesthetics in FICB.

Kumie FT[23] et al used 0.25% 30 ml fixed volume for FICB.

DEMOGRAPHIC PROFILE :TABLE 2 shows comparable demoghraphic parameters.**Kumaran Rasappan[32] et al** has given continuous FICB in Geriatrics Patient.**Par Wennberg[31] et al** in his study after applying excluding criteria they divide 127 patients in intervention group and control group and compared analgesic

characteristics.In contrast our study in adult population,**Zhong HY[46] et al** Studied efficacy of FICB in pediatrics population.**Kumaran Rasappan[32] et al** had used FICB in various hip surgeries as in our study .

COMPARISON OF VAS AT BASELINE AND AT THE TIME OF INDUCTION.

In group A baseline VAS was (7.27±0.82) and at the time of induction it was (7.07±0.82).in group B baseline VAS was (7.23±0.77) and at the time of induction (2.6±0.49). p<0.001

Same as our study **Devender kumar[5] et al** measured baseline and after procedure 20 min VAS for assessment of analgesia & success of block

Stable . P >0.05

Chunyan Lin[3] et al & Fumie et al concluded Stable parameters in ficb group.

In contrast to our study **Zhong HY[46] et al** have noticed Stable hemodynamic parameters in FICB Group than control Group.With help of increase in concentration sevoflurane & fentanyl aliquots intraoperatively depth of anaesthesia was maintained In Present Study.

End Tidal sevoflurane requirement.: All the patients Group B had less mean End Tidal sevoflurane requirement (0.56) compare to the group A(1.75), P <0.001.**Zhong HY[46] et al** have maintained hemodynamic parameters and BIS with increasing concentration sevoflurane.

Intraoperative fentanyl requirement. All the patients in Group B (0.33±0.47) had less Intraoperative fentanyl requirement compare to the group A (2.77±0.67), P <0.001.Zhong HY[46] et al observed decrease Mean fentanyl consumption in FICB (92.5) compared to control (116) group.Fujihara Y[11] et al observed that FICB (92±6.3) lower additional opioids and NSAIDs (31±18.2) usage.

Time to Reversal to Extubation. All the patients in Group B (11.33±2.23) had less Time To Reversal To Extubation compare to the group A (26.20±2.97), P <0.001. Zhong HY[46] et al studied The FICB combined with general LMA anesthesia apart from analgesia it also decrease the time of reversal to extubation. In FICB group (6.5) compared to control group (8.7).p <0.001.

Time to Attain Modified Aldrete Score >9. All the patients in Group B (14.7±1.86) had less Time to Attain Modified Aldrete Score >9 compare to the group A (34.80±3.13), P <0.001. This statistical difference might be due to fentanyl and sevoflurane requirement was more in Group A than Group B.Zhong HY[46] et al observed MAS in FICB group (32.2) compared to control group (40.5).

TABLE 8 shows Postoperative VAS SCORE. All the patients in Group B (2.53) had less Postoperative MEAN VAS SCORE compare to the group A(4.67), P <0.001.Daniel Godoy Monzón[25] et al studied FICB analgesic characteristics with bupivacaine and concluded that there is significant VAS score reduction up to 8 hr in FICB group (3.8) compare to NSAIDS Group (7).

Fujihara Y[11] et al concluded FICB lower the vas score mean preoperative VAS scores at preoperative, 10 min, 12 Hrs are (9, 3, and 6).

Kumie FT[25] et al observed VAS score at 6 hrs P <0.001 at 12 hr P<0.006 significantly reduced in FICB group compared to Control Group.

TABLE 9 shows Time to First Analgesic Request. All the patients in Group B (9.06±0.90) had delayed Time to First Analgesic Request compare to the group A (1.48±0.50), P <0.001.

Daniel Godoy Monzón[25] et al have shown that FICB prolongs time to first analgesic request up to 8 hrs, they have given FICB with anatomical Landmark guided method whereas we have given FICB US Guided method.

Kumar N S[22] et al observed mean analgesia time with bupivacaine is (7.85±1.62).

J steenberg[20] et al observed mean postoperative analgesia time of at least 8 hrs (480 min).

Kumie FT[25] et al observed first analgesic request at 417.50 min after FICB in comparison to Control Group that was 139.25 min.

Yun M[44] et al found first analgesic request at 8.6 hrs after FICB in comparison to Control Group that was 4.5 hrs.

TABLE 9 shows Total Analgesic Requests. All the patients in Group B (1.33±0.47) had Less Total Analgesic Requests compare to the group A (3.53±0.50), P <0.001.Robert Keehan[21] et al observed that total tramadol used in patient of control group is approximately 4 times a day (400 mg a day).

Kumar N S[22] et al **observed** total analgesic request of 5(Tramadol 50 mg for each request) within 24 hrs of FICB.

Dulaney-Cripe E[9] et al observed that FICB reduce overall opioid (400 mcg in 24 hrs) usage in elderly population compare to FICB group.

COMPLICATIONS

There were no complication of drug itself and procedure elicited in any group in our study.it might be due to usage of US guided method of FICB. No patients have delirium or transient neurological complication.

Linyi Yang[43] et al have done meta-analysis and showed that US guided FICB is safe anaesthesia technique and in anatomical landmark guided technique Hematoma, Emphysema, Bladder Rupture were reported. But without any adverse effects.G. Mouzopoulos[25] et al observed that delirium is seen significantly less in FICB group (10.78%) compare to control group(23.8%) and no other complication seen. local hematomas developed at the

injection site which resolved spontaneously.Chunyan[3] Lin et al have measured self-rating depression scale & self-rating anxiety scale in their study before and after anaesthesia and concluded that both scores were decreased in FICB group in comparison to CSEA group.Ruzbarsky JJ[35] et al & Neuman MD[26] et al have noticed pulmonary complication post operatively in geriatrics patient**.**

Peter M Odor[30] et al Concludes supportive evidence for a beneficial effect of FICB in protecting against cognitive impairment in elderly patients with hip fracture

IV. Conclusion :

In Nutshell, US Guided FICB when given with general anaesthesia, Provides less intraoperative opioid & sevoflurane requirement, provides hemodynamic stability and effective postoperative analgesia and curtail requirement of total postoperative analgesic consumption without any adverse effects. FICB is safe and effective adjuvant to general anaesthesia in perioperative Multimodal analgesia for Hip Surgeries.

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