

A Comparative Study of Ultrasound Guided Three In One Block And Ultrasound Guided Fascia Iliaca Compartment Block for Postoperative Analgesia in Patients Undergoing Lower Limb Orthopaedic Surgeries

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Abstract:

Background and aims: Peripheral nerve blocks are frequently performed in the perioperative period for postoperative analgesia in lower limb surgeries. Though there are various techniques available to block the nerves of lower limb, a definitive method of choice remains inconclusive. The aim of this study was to compare the ultrasound guided three in one block and ultrasound guided fascia iliaca compartment block in patients undergoing lower limb surgeries for postoperative analgesia. **Methods:** In this randomised prospective single blinded comparative study, 60 patients of both sexes were randomly divided into two groups of 30 each. Patients of group 1 were given a three in one block and patients of group 2 were given fascia iliaca compartment block. The primary objective was to analyse the postoperative analgesia by visual analogue scale at various time intervals and the time for requirement of rescue analgesia also monitored. The secondary parameters were the hemodynamic changes at various time periods. Statistical comparison between the two groups was done using SPSS 23. For qualitative variables, chi-square test was used and statistical significance defined as $p < 0.05$. **Results:** There was no difference between the two groups with respect to hemodynamic parameters signifying equal effectiveness. Both the groups had effective postoperative analgesia for 5 to 6 hours with a successful sensory blockade of lateral femoral cutaneous nerve in fascia iliaca compartment block. The rescue analgesia, postoperative opioid consumption was also similar among the two groups indicating equal efficacy. **Conclusions:** Fascia iliaca compartment block is a good alternative to three in one block for postoperative analgesia in patients undergoing lower limb orthopaedic surgeries, in addition to an effective blockade of lateral femoral cutaneous nerve.

Key words: Nerve block, three in one block, fascia iliaca compartment block, postoperative analgesia, lower limb surgery.

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I. Introduction:

Major lower limb surgeries involving long bones like femur are extremely painful necessitating aggressive pain management. Inadequately treated pain can have a negative impact on patient recovery, especially difficulty in physiotherapy leading to joint stiffness and slow progress in ambulation. Though there are many methods for analgesia, peripheral nerve blocks using ultrasound guidance provides accuracy for nerve localisation, less time to perform, better visualisation of direct spread of local anaesthetic and increased success rate of block. The most common peripheral nerve block to facilitate postoperative analgesia for lower limb surgeries is three in one block, in which a single injection is used to block femoral nerve, lateral femoral cutaneous nerve and obturator nerve. An alternative to three in one block called fascia iliaca compartment block was originally described for use in paediatric patients. Hence we describe a study comparing ultrasound guided three in one block versus fascia iliaca compartment block for postoperative analgesia in patients undergoing lower limb orthopaedic surgeries involving femur.

II. Methods:

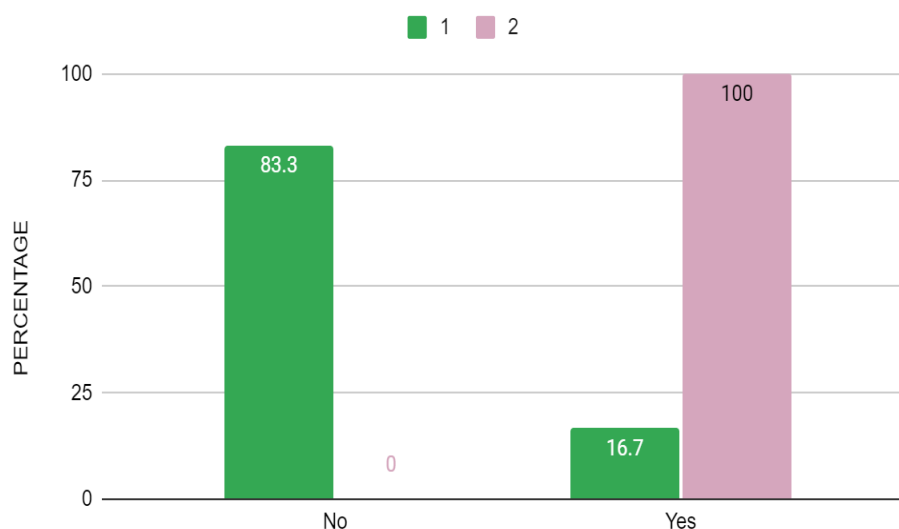
After obtaining approval from the institutional ethical committee and written consent from the patients, 60 patients scheduled to undergo femur involving orthopaedic surgery under spinal anaesthesia in Coimbatore medical college hospital were enrolled in the study. They were allocated in 2 groups by lots method; for group 1 three in one block was given and group 2 received fascia iliaca compartment block. Patients were kept nil per oral as per the standard guidelines. Patients were shifted to operation theatre, monitors connected and preoperative vitals were recorded. Under strict aseptic precautions, patient in sitting position, subarachnoid

block was given. Towards the end of procedure, patient in supine position, under strict aseptic precautions, ultrasound probe was placed in horizontal direction over the anterior part of the thigh above the inguinal ligament. In group 1 patients, femoral artery, femoral vein and femoral nerve were localised; after negative aspiration, 20 ml of 0.5% bupivacaine was injected around femoral nerve. For the group 2 patients, probe was moved laterally to trace fascia iliaca which lies above the iliacus muscle. Needle tip was placed beneath fascia iliaca, after negative aspiration, 20 ml of 0.5% bupivacaine was injected. Postoperative analgesia achieved with both blocks was recorded at 2, 4, 6, 8, 10, 12 & 24 hours using visual analogue scale. The time at which first rescue analgesia was taken, was also monitored. Hemodynamic changes like heart rate, blood pressure and saturation were recorded at 2, 4, 6, 8, 10, 12 & 24 hours postoperatively. Statistical analysis was performed using statistical package SPSS 23. For qualitative variables, chi-square test was used and statistical significance defined as $p < 0.05$.

III. Results:

All the 60 patients enrolled in the two groups were analysed. The two groups were comparable with respect to patient's age, sex, height, weight and BMI. The baseline vital parameters were comparable between the two groups. Duration of postoperative analgesia using visual analogue scale showed no difference between the two groups, except the 8th hour where also the mean difference is 0.595. In terms of rescue analgesia also, there was no statistical difference between the two groups. But the lateral femoral cutaneous nerve block was 100% in group 2, compared to 16.7% in group 1, which is statistically significant.

LATERAL FEMORAL CUTANOUES NERVE BLOCK



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IV. Discussion:

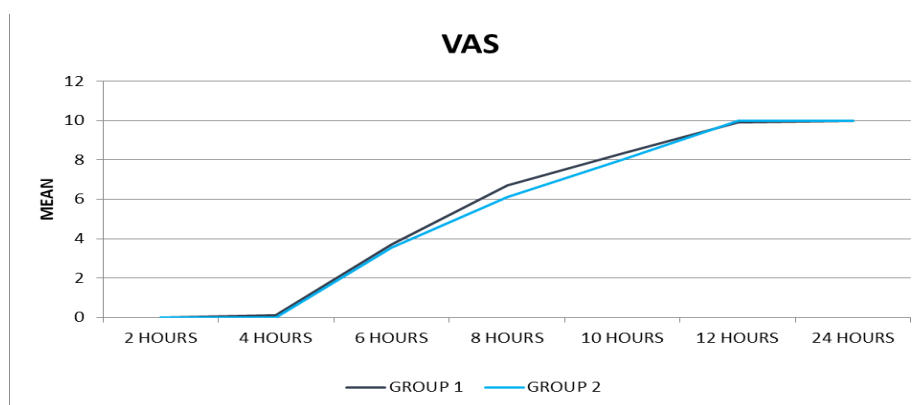
Previously femoral nerve, three in one block was performed for postoperative analgesia after hip repair and replacement. Many studies in adults and children showed that ultrasound guided three in one block was technically superior with less opioid consumption. Later fascia iliaca compartment block (FICB) was introduced which also had efficient patient satisfaction. Here we have compared both three in one block and fascia iliaca compartment block for postoperative analgesia, opioid requirement and patient satisfaction. We conducted a randomised control study to compare the postoperative analgesic effect of 3 in 1 block and FICB and the time of requirement of first rescue analgesia. In this study 60 healthy adults of ASA 1&2 undergoing elective femur or hip or knee surgery between the age group of 30-40 was selected and divided equally into two groups. After the elective procedure, both the groups received lower limb blocks and observed. Postoperatively patient's heart rate, systolic blood pressure, diastolic blood pressure, oxygen saturation, Visual Analogue Scale score, time for first rescue analgesia were recorded at 2nd, 4th, 6th, 8th, 10th, 12th and 24th hour respectively.

It was observed that the majority (around 55%) of the study population were between 31 and 50 years. Another 32% were below 30 years. The male to female population ratio was 3:1. 60% of the people were having normal BMI, were ASA 1 while 38% belonged to ASA 2. There is no difference between both the groups with respect to age ($p=0.09$), sex ($p=0.5$), BMI ($p=0.5$) as it is statistically insignificant.

The heart rate overall increased from baseline to 92.8 at fourth hour. Then it gradually decreased and was around 75 beats/ minute up to 24 hours. The systolic blood pressure was less at 2 hours and it gradually

increased to normal level from 6th hour, was maintained at that level till 24 hours. The diastolic pressure was on an average less at 2nd hour and still reduced to 67 at 4th hour. Then it gradually increased to 75 and remained at 72 throughout. The SpO₂ level was uniformly maintained throughout the whole process which implies that there is no difference between the two groups in respect to hemodynamic parameters signifying both are equally effective.

The postoperative VAS score at different time period is not statistically significant with p value 0.1, 0.2, 0.005, 0.019, 0.321 at 4th, 6th, 8th, 10th, 12th hour respectively. There is no difference between both groups with respect to VAS score, except at 8th hour where the mean difference is only 0.595. The VAS score is zero at 2nd hour and it increases till 12th hour and it is maintained till 24 hours.



Lateral femoral cutaneous (LFC) nerve block is statistically significant among two groups with $p=0.000$, where 100% of patient with FICB had successful LFC sensory blockade when compared to 16.7% in those with 3 in 1 block. The time for rescue analgesic requirement is also statistically not significant with $p>0.01$. Thus both the blocks have same postoperative analgesic effect, requirement of rescue analgesia is also not statistically significant with successful effective blockade of lateral femoral cutaneous nerve in FICB group. So fascia iliaca block can be considered as an alternative to three in one block for postoperative analgesia in patients undergoing lower limb orthopaedic surgeries.

V. Conclusion:

Both three in one block and fascia iliaca compartment block provides same duration of postoperative analgesia, patient satisfaction and no significant hemodynamic changes. The sensory blockage of lateral femoral cutaneous nerve is achieved successfully in fascia iliaca compartment block whereas it is spared in three in one block. FICB provided an anatomically safe block, as the needle is placed more lateral from the femoral vasculature thus reducing accidental intravascular administration. Hence fascia iliaca compartment block can be used as an alternative to three in one block for postoperative analgesia in patients undergoing lower limb orthopedic surgeries.

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