**KHUH RESEARCH PROPOSAL**

**Title**: Impact of adductor canal block versus femoral nerve block for post-operative analgesia in total knee arthroplasty.

**Premise of the study:** Adductor canal block provides early ambulation compared to femoral nerve block using bupivacaine for patients undergoing total knee arthroplasty (TKA).

**Background**: The development of joint replacement is regarded as one of the most significant advances in orthopedic surgeries. Total knee replacement is associated with significant potential perioperative morbidity as infection, DVT, pain and increase the incidence of revision because the limited time of the protheses (1) . In this regard, anesthesia is of prime importance to reduce postoperative pain and morbidity. Anesthesia for total knee replacement should provide stable intraoperative conditions and rapid recuperation. Analgesia techniques should aim to provide optimal pain relief whilst minimizing side effects. There is now good evidence that well-conducted regional analgesia can achieve these aims, leading to improved functional recovery facilitated by more rapid and effective joint rehabilitation.

Various techniques have been implied like local anesthetic infiltration has become increasingly popular in the last decade as a component of multimodal analgesic regime which has facilitated early recovery and patient satisfaction (13, 14). Combination of long acting local anesthetic, epinephrine, narcotics, non-steroidal analgesics, corticosteroids and clonidine . (15). Its is easy to be administer and does not result in motor block which contributes to early ambulation.

**Statement of the problem**: The comparative analgesic effect of Adductor canal block ( ACB ) and femoral nerve block ( FNB ) has not been adequately reported in patients undergoing TKA.

**Significance**: Clinical trials investigating different modalities of administering analgesia in total knee replacement have reported comparative efficacies between single shot femoral nerve block (SSFNB) and adductor canal block. A recent retrospective study examining the pain rating, side effects and ambulation found that an adductor canal block with provided comparable analgesic effects when compared to single shot femoral nerve block after TKA; and might be associated with early ambulation than femoral nerve block post-operatively (11).

In Jon Koh have studied the comparative efficacy of adductor canal block and femoral nerve block using a randomized trial. The authors concluded that patients receiving adductor canal block had comparable pain score and opioid consumption post operatively, with superior quadriceps strength in Adductor canal block.

**General Objective**: To study the impact of femoral nerve block using 20ml of 0.5% bupivacaine, and comparing it to adductor canal block on post-operative pain control in TKA.

**Specific Objectives**: To study and compare the following in both the study groups:

1. Amount of PCA (Morphine) required within first 24hours
2. Visual analogy pain score (VAS) at rest and flexion of operated knee.
3. Nausea and vomiting and any other side effects.
4. Time of ambulation

**METHOD:**

**Setting:** Orthopedic ward and recovery room at King Hamad University Hospital (KHUH)

**Design**: Double blinded Randomized control trial

**Subjects**: Patients for elective TKA at KHUH.

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| **Inclusion Criteria** | **Exclusion Criteria** |
| 1. Primary electric total knee replacement
2. Patients fulfilling criteria 1-2 of American Society of Anesthesiologists (ASA)
 | 1. ASA physical status >3
2. History of allergy/contraindications to morphine, local anesthetics, non-steroidal anti-inflammatory drugs, paracetamol, central neuraxial block and peripheral nerve blocks
3. Regular opioid use
4. Peripheral neuropathies
5. History of chronic pain at site(s) other than joint replacement
6. Renal and/or hepatic impairment
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**Sample size:** 35 participants in each arm

**Sampling Technique**: Convenience sampling

**Time Frame** **of the study**

Data collection: 8 months Data analysis and report writing: 2 months

**Data Collection methods, instruments used and measurements**:

After obtaining written informed consent from the patients, the patients will be monitored in the operation theater with ECG, pulse oximetry, temperature and NIBP. Intravenous access with 18G or 20G cannula will be obtained. Intravenous fluids ringer lactate or normal saline (5 ml / kg/hr) will be given.

Vital signs will be recorded during the procedure (anesthesia) and throughout the surgery, every five minutes. Spinal anesthesia for both groups will be administered using 0.5% bupivaicine 2.8ml and fentanyl 20mcg. Patients will be allocated into two groups:

1. Adductor block group (ACB).
2. Femoral nerve block single shot group (FNB)

The procedure will be performed by a senior anesthesiologist in FNB group and in ACB group, who will be not involved in post-operative evaluation of the patients.

The patient of FNB group will receive a single injection femoral nerve block after the surgery. A high-resolution ultrasound device (sonosite) will be used to locate the femoral nerve. Direct visualization of needle tip will be maintained by ultrasound while inserting the needle, until the needle reaches close to the femoral nerve. The site of injection will be confirmed by nerve stimulator after getting the ipsilateral quadriceps contraction (patellar movement) at 0.5 mA, (stimulator frequency at 2 Hz and pulse width of 0.1 sec). At this site, *20 ml of 0.25 % Bupivacaine* will be injected slowly after negative aspiration. During the injection the spread of local anesthetic solution within the fascial space will be visualized by ultrasound. The injection can be stopped and needle will be repositioned if patient complains of pain during injection.

In ACB group, an adductor canal block 20 ml of 0.25% Bupivacaine would be administered.

After surgery, patient will be kept in recovery for 1 hour and will be shifted to the ward under the supervision of anesthesiologist, unaware of patient group in the study. Post-operative recording will be assessed on an arrival in ward, and every 2 hourly. Oxygen will be continued at rate of 4 liters per minute for 24 hours.

Primary endpoint will be the amount morphine required in first 24 hours. Secondary endpoints will be VAS scores, side effects and patient comfort.

**Data Management & Analysis**:

1.The amount of Morphine required in first 24 hours and VAS scores will be compared between all the groups at various intervals using a mixed factorial ANOVA.

2.The comparison of presence/ prevalence of different morbidities in all the groups will be done using chi-square tests and logistic regression analysis.

**Implications of Results to Population Health and Health System Policy in KHUH and Bahrain**

Information on the efficacy and safety of using ACB and FNB will help strengthen the available evidence base in this area which will eventually help in improving postoperative analgesia in patients undergoing total knee replacement.

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