Efficacy of Epidural Analgesia versus Ultrasound guided Femoral Nerve Block in Postoperative Pain Relief in case of Total Knee Surgery.

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Abstract: Surgeries of the knee are associated with moderate to severe postoperative pain. Uncontrolled postoperative pain has an adverse sequel of delayed resumption of normal pulmonary function, restriction of mobility, nausea and vomiting, increase in the systemic vascular resistance, cardiac work, and myocardial oxygen consumption. So these procedures are better to be done under regional anesthetic techniques which reduce neuroendocrinal stress responses, central sensitization of the nervous system and muscle spasms which occur in response to painful stimuli. Recently, among these regional anesthetic techniques PNB are gaining popularity because they reduce the possibility of complications and side effects associated with the central blocks. Femoral block provide effective analgesia with potentially fewer complications and side effects than epidural blocks. The purpose of this study was to compare between epidural analgesia and femoral nerve block in adult patients undergoing total knee replacement including comparison of analgesic efficacy, side-effects, and complications. The study was performed upon 40 patients, aging 40-70 years, and randomly distributed among two groups: **Group A:** 20 patients received lumbar epidural analgesia. **Group B:** 20 patients received femoral nerve block. For each patient, the following data were collected: age, sex, weight, height, ASA, duration of surgery, hemodynamic changes, incidence of postoperative complications, pain scores. The results showed that performing femoral nerve block provided effective analgesia, equivalent rehabilitation and duration of hospital stay in addition to fewer complications in comparison to epidural analgesia such as hypotension, postoperative vomiting and urinary retention.

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1. Introduction

Total knee arthroplasty (TKA) is regarded as an effective treatment for end-stage knee osteoarthritis. The increased life expectancy and better medical care have significantly escalated the number of TKA performed. ***(Kuperman et al., 2016)***

In the last decade, TKA replaced coronary artery bypass graft surgery as the most common major surgery performed in the developed world. ***(Kuperman et al., 2016)***

In the United States, more than 7, 23, 000 knee replacement surgeries were performed in 2014. Cesarean section is the only surgery done more often than TKA. ***(Karkhur et al., 2018)***

TKA has been demonstrated to be a cost-effective procedure for degenerative diseases of the knee joint. It is one of the most common surgeries performed today, even in the Indian subcontinent. ***(Karkhur et al., 2018)***

Although different techniques are used, the best technique based on efficacy and safety has not been determined. General anesthesia, neuroaxial blockades, and peripheral nerve blocks represent the techniques used more often ***(*Morales-Munoz *et al., 2017)***.

TKA is associated with severe postoperative pain and effective postoperative analgesia after TKA remains a challenge. ***(Grosu et al., 2014)***

The incidence of moderate-to-severe pain after TKA is reported to be about 50%, and it can contribute to immobility-related complications, delay in hospital discharge, and may interfere with functional outcome. ***(Grosu et al., 2014)***

Pain is one of the most common symptoms requiring hospital admissions after outpatient surgery. Poorly treated pain can have negative impact on recovery especially owing to disruption in physiotherapy resulting in stiffness of joints and slow progress in mobility. ***(Srivastava et al., 2007)***

Early mobilization is a challenge after TKA when a patient has severe pain and is receiving pain treatment. Despite a comprehensive multimodal analgesic regimen, TKA is often associated with intense postoperative pain. ***(Sigirci et al., 2017)***

Multiple and multimodal approaches to its relief have been tried, which include neuraxial blockade,

systemic opioids, intrathecal opioids, systemic steroid/non-steroidal analgesics, local infiltration analgesia, and peripheral nerve blockade (PNB). ***(McIsaac et al., 2017)***

Epidural analgesia being a viable alternative, however, faces a relatively high failure rate and may result in side effects such as urinary retention and motor block, with the latter potentially hindering mobilization. ***(*Karkhur *et al., 2018)***

PNBs are commonly used to relieve pain and to reduce opioid requirements and their adverse effects. PNB for TKA is associated with significantly lower hospital length of stay and also with a lower risk of re-admission. ***(Grosu et al., 2014)***

Femoral nerve block (FNB) is one of the most commonly used nerve blockades and has been shown to be effective in reducing the usage rate of opioid painkiller and shortening hospital stays. ***(Grosu et al., 2014)***

Despite the growing interest in the use of ultrasound (US) imaging to guide performance of regional anesthetic procedures such as peripheral nerve blocks, controversy still exists as to whether US is superior to previously developed nerve localization techniques such as the use of a peripheral nerve stimulator (PNS). ***(Abrahams et al., 2009)***

Aim of the Work:

The aim of the study is to compare the efficacy of epidural analgesia versus ultrasound guided femoral nerve block in postoperative pain relief in case of total knee surgery.

2. Patients and Methods

Forty patients presenting to Mataria Teaching hospital for total knee replacement surgeries were enrolled in this prospective experimental study after providing written consents. Participants were instructed about the use of visual analog pain scale (VAS). Approval was obtained from the research ethics committee of anesthesia and intensive care department.

In this study all patients were preoperatively assessed for evaluation of their medical status.

Inclusion criteria:

Include that patient's age range between forty and seventy year's old undergoing knee replacement surgeries ASA I-III and with normal coagulation profile.

Exclusion criteria:

Patients with the following conditions were excluded from the study:

- Refusal to participate in the study.
- Peripheral neuropathies.
- Hypersensitivity to drugs used for analgesia.
- Infection at the site of puncture.
- Spinal deformities or history of spinal surgery.
- Time of operation >3hours.
- Other contraindications to neuraxial blockade.

Anaesthetic protocol:

All anaesthetic blocks were performed by the same anesthesiologist, and spinal anesthesia was induced for all patients.

All blocks were performed under complete aseptic techniques, using fenestrated sterile fields, sterile gloves, cap and face mask.

Patients were assigned randomly into two equal groups:

- **Group A: (n = 20):** patients receiving epidural analgesia.
- **Group B: (n = 20):** patients receiving ultrasound guided femoral nerve block.

Methodology

Preoperative day:

Routine preoperative assessment was done for every patient including: history, clinical examination, laboratory investigations (complete blood picture, kidney function tests, liver function tests, coagulation profile) and ECG was done for patients above 40 years. The study protocol was explained to the patients after taking their consent.

Operative day:

Anaesthetic technique:

Upon arrival of the patient to the induction room, blood pressure and heart rate were measured and recorded. A suitable peripheral vein was cannulated, 10-30 mcq/kg midazolam was given for sedation and Ringer solution of 10 ml/kg started.

Upon arrival to the operating room, continuous monitoring with electrocardiography, non-invasive blood pressure and pulse oximetry was started.

In all cases Povidone-iodine (Betadine®) was used for antisepsis of the skin of the groin, gluteal and lumbar regions, and the blocks were performed under complete aseptic conditions.

Group A epidural analgesia:

Under complete aseptic conditions and after skin sterilization, local anesthesia was given by infiltration of the skin and subcutaneous tissues with 3-5 ml lidocaine 2%.

A 20G lumbar epidural catheter **(Perifix B-BRAUN)** (figure 1) was placed at the L_{3-4} level in the sitting position using loss of resistance technique through an 18G Tuohy needle. Catheters were fixed to the skin leaving 4cm in the epidural space. 3 mL lidocaine 2% with adrenaline (1:200 000) were given to test for intravascular or intrathecal placement. 10 mL of bupivacaine 0.25% was injected as a bolus.

In the PACU after the end of surgery (VAS 2-3) the epidural catheter was connected to a fersenius syringe pump containing bupivacaine 0.125% and fentanyl 2µg/mL and the infusion rate was 5-10 mL/h.

Figure (1): Perifix B-BRAUN epidural set ***(Bbraun, 2014).***

Group B femoral nerve block:

Under complete aseptic condition, the patient in the supine position. According to the classical inguinal paravascular approach described by Winnie ***(Winnie et al., 1974),*** a line will be drawn between the anterior superior iliac spine and the pubic tubercle identifying the inguinal ligament.

After skin disinfection and covering the puncture site with sterile drapes. the femoral nerve was visualized using a 38 mm, L25x/13-6 MHz, linear array transducer with a portable, bedside Ultrasound unit.

At the inguinal crease exactly in the middle of the transducer, the skin and the subcutaneous tissue were locally infiltrated with lidocaine 2%.

The femoral artery and femoral vein are visualized in cross section. Just lateral to the artery and deep to fascia iliaca, the femoral nerve appears in cross section as a spindle –shaped structure with honey comb appearance.

20 mL of bupivacaine 0.25% was injected as a bolus encircling the nerve through a 5-cm **Contiplex cannula (B. Braun) (**figure 2) inserted in plane with ultrasound probe. A 20G catheter was then inserted 5 cm past the cannula.

Catheter was positioned close to the targeted nerve under ultrasound visualization, secured to the skin with catheter clamps and covered with a transparent dressing.

In the PACU after the end of surgery (VAS 2-3) the catheter was connected to a fersenius syringe pump containing bupivacaine 0.125% and fentanyl 2 µg/mL and the infusion rate was 5-10 mL/h.

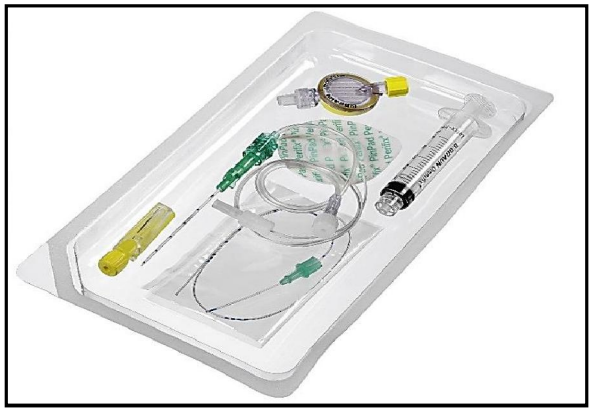

Figure (2): Contiplex B. Braun set for continuous nerve blocks ***(Bbraun, 2014).***

Anaesthesia in both groups:

The primary anaesthetic technique in both groups will be spinal anesthesia.

The patients will be seated in position to facilitate location of intervertebral spaces, the skin will be sterilized at the site where the spinal anesthesia would be administered.

Following identification of either the L3-L4 or L4-L5 interspace, local anaesthesia for skin with xylocaine 2%, then a 25 –gauge spinal needle will be inserted midline and heavy bupivacaine 0.5% (2.5ml)+25mcg fentanyl (0.5ml) will be injected intrathecally.

As soon as the sensory block reaches the appropriate level for surgery, the operation will be started.

Post operatively, patients were transported to PACU for the 8 postoperative hours.

Measurements:

The following measurements were carried out in both groups:

1- Patient demographics including age, sex and weight were recorded for all the patients.

2- **Clinical:**

a) Sensory block of the leg to be operated was assessed by loss of temperature discrimination to ice. Testing was performed on the anterior aspect of the thigh (femoral nerve), medial aspect of the thigh (obturator nerve) and the lateral aspect of the thigh (lateral femoral cutaneous nerve). ***(Desborough et al., 2000)***

The block was assessed according to the following scale***:***

i. Complete when no cold discrimination is observed.

ii. Partial when cold discrimination is decreased.
iii. Absent when normal cold discrimination is observed.

b) Femoral motor block was assessed in the knee to be operated every five minutes during the first 20 min after injection by testing knee extension, and was considered:

i. Complete when no extension was observed,
ii. Partial when quadriceps motor force was decreased and.
iii. Absent when normal quadriceps function was observed. ***(Desborough et al., 2000)***

3- Vital signs:

a) Heart rate (beats/min),
b) Mean arterial blood pressure (mm/Hg).

4- Pain assessment:

a) The Visual Analogue Scale (VAS) (figure 3):

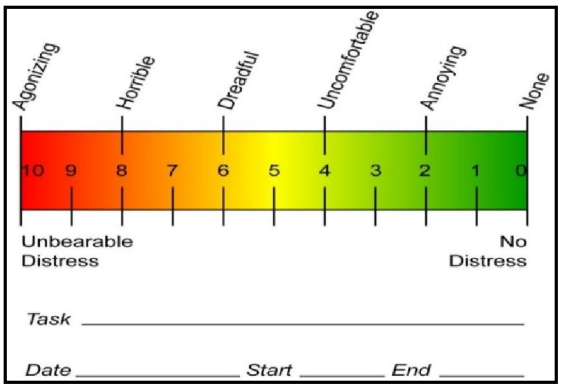

Figure (3): Visual Analogue Scale ***(Carr et al., 1999).***

The visual analogue scale uses a straight line with extremities of pain intensity on either end. The line is typically 100 mm long with one end defined as "no pain" and the other end being excruciating unbearable pain". The line can be either vertical or horizontal. The patients are asked to place a mark on the line to describe the amount of pain that they are currently experiencing. To assist in describing the intensity of pain, words can be placed along the scale (e.g., mild, moderate or severe ***(Carr et al., 1999).***

b) Total amount of postoperative rescue analgesia and time of its request.

5- Postoperative complications:

Any postoperative complications were spotted and recorded such as and not restricted to:-

a) Perineural catheter complications (catheter kinking or leaking, dislodgement and retention);

b) Local anaesthetic toxicity (tinnitus, perioral numbness, seizure).

c) Postoperative nausea and vomiting (PONV): ***(Hebl et al., 2008)***

i. None;
ii. Yes, requires and relieved by treatment;
iii. Yes, but not relieved by treatment.

Intravenous metoclopramide (10 mg) and Ondansetron (4 mg) were given as the first and second lines of treatment of vomiting respectively.

d) Urine retention.
e) Dizziness and sedation.

Timing of measurements:

1- Sensory and femoral motor block were assessed, every 5 minutes during the first 20 min after injection of the local anaesthetic.

2- Vital signs, VAS, were recorded at the following times: baseline pre injection, every 15 min in the 1st hour then every hour for 7 hours postoperative constituting the study period.

3- Total amount of analgesia required and time of their request were assessed at the end of the 8 hour constituting the study period.

4- Any postoperative complications occurring at any time in the 8 hour study period were spotted and recorded.

Statistical analysis:

Recorded data were analyzed using the statistical package for social sciences, version 20.0 (SPSS Inc., Chicago, Illinois, USA). Quantitative data were expressed as mean± standard deviation (SD). Qualitative data were expressed as frequency and percentage.

The following tests were done:

- Independent-samples t-test of significance was used when comparing between two means.
- Mann Whitney U test: for two-group comparisons in non-parametric data.
- Chi-square (x^2) test of significance was used in order to compare proportions between qualitative parameters.
- The confidence interval was set to 95% and the margin of error accepted was set to 5%. So, the p-value was considered significant as the following:
- Probability (P-value)

– P-value <0.05 was considered significant.
– P-value <0.001 was considered as highly significant.
– P-value >0.05 was considered insignificant.

3. Results

The results of the present study are demonstrated in the following tables.

Table (1): Comparison between groups according to demographic data.

Demographic data	Group A (n=20)	Group B (n=20)	t/x2#	p-value
Age (years) Mean±SD Range	 51.90±9.78 40-69	 51.05±6.67 42-68	0.103	0.750
Sex Female Male	 8 (40.0%) 12 (60.0%)	 11 (55.0%) 9 (45.0%)	0.902#	0.342
Weight (Kg) Mean±SD Range	 90.30±10.72 70-105	 89.35±7.22 73-101	0.108	0.744
Height (cm) Mean±SD Range	 174.55±7.69 160-188	 177.70±7.36 163-189	1.750	0.194
ASA I II III	 5 (25.0%) 13 (65.0%) 2 (10.0%)	 4 (20.0%) 13 (65.0%) 3 (15.0%)	0.311#	0.856
Duration of surgery (minutes) Mean±SD Range	 161.50±13.88 135-188	 159.15±14.16 130-180	0.281	0.599

t-Independent Sample t-test; #x^2: Chi-square test p-value >0.05 NS

This table shows no statistically significant difference between groups according to demographic data.

Table (2): Comparison between groups according to mean arterial blood pressure (mmHg).

Mean Arterial blood pressure (mmHg)	Group A (n=20)	Group B (n=20)	t-test	p-value
Before injection Mean±SD Range	 94.35±5.40 89-105	 94.95±5.37 87-103	0.124	0.726
After 15min. Mean±SD Range	 75.50±5.90 68-85	 94.25±4.90 87-103	119.627	<0.001**
After 30min. Mean±SD Range	 67.00±5.45 60-77	 93.20±4.94 86-102	253.940	<0.001**
After 45min. Mean±SD Range	 68.00±3.09 64-75	 91.90±5.01 85-100	328.978	<0.001**
After 60min. Mean±SD Range	 67.85±2.01 65-72	 90.75±4.91 83-99	372.966	<0.001**
After 1hr. Mean±SD Range	 68.15±1.23 66-70	 89.50±4.66 82-98	392.283	<0.001**
After 2hr. Mean±SD Range	 68.95±1.28 67-71	 88.25±4.59 80-96	328.642	<0.001**
After 3hr. Mean±SD Range	 70.65±1.23 68-73	 87.30±4.28 80-94	279.614	<0.001**
After 4hr. Mean±SD Range	 73.20±1.44 70-76	 86.25±4.24 79-94	169.878	<0.001**
After 5hr. Mean±SD Range	 76.40±1.60 74-80	 85.00±3.97 80-93	80.576	<0.001**
After 6hr. Mean±SD Range	 79.30±1.92 75-82	 84.85±3.59 79-92	37.188	<0.001**
After 7hr. Mean±SD Range	 81.45±2.24 76-85	 84.00±2.96 80-90	9.469	0.004*

*t-Independent Sample t-test; p-value >0.05 NS; *p-value <0.05 S; **p-value <0.001 HS*

This table shows statistically significant drop in mean arterial blood pressure was more encountered in group A. (P value <0.001) (table 2).

Table (3): Comparison between groups according to heart rate (Beat/min).

Heart Rate (Beat/min)	Group A (n=20)	Group B (n=20)	t-test	p-value
Before injection Mean±SD Range	 110.50±4.41 105-120	 110.85±4.11 104-118	0.068	0.796
After 15min. Mean±SD Range	 109.30±4.17 103-116	 104.70±2.90 100-110	16.396	<0.001**
After 30min. Mean±SD Range	 108.15±4.15 100-115	 103.80±3.14 100-110	13.996	<0.001**
After 45min. Mean±SD Range	 107.85±5.46 95-117	 102.70±2.83 98-107	14.022	<0.001**
After 60min. Mean±SD Range	 106.00±6.55 92-116	 102.10±3.65 95-108	5.403	0.026*
After 1hr. Mean±SD Range	 105.85±6.00 98-115	 100.00±4.00 92-106	13.155	<0.001**
After 2hr. Mean±SD Range	 104.40±3.59 99-113	 97.85±3.91 90-104	30.453	<0.001**
After 3hr. Mean±SD Range	 101.05±3.62 94-106	 95.60±3.66 88-100	22.406	<0.001**
After 4hr. Mean±SD Range	 98.70±2.79 95-103	 93.50±3.40 87-99	27.983	<0.001**
After 5hr. Mean±SD Range	 97.30±3.66 90-102	 92.10±3.45 86-99	21.407	<0.001**
After 6hr. Mean±SD Range	 96.00±4.42 88-102	 90.45±3.38 84-96	19.874	<0.001**
After 7hr. Mean±SD Range	 95.40±3.27 88-99	 89.25±3.85 82-95	29.662	<0.001**

t-Independent Sample t-test;
p-value >0.05 NS; *p-value <0.05 S; **p-value <0.001 HS

This table shows statistically significant difference between group B from group A according to heart rate from after 15 min. to after 7 hrs.

Intraoperative ephedrine administration

Regarding the intraoperative use of ephedrine to treat hypotension episodes, data showed significant higher incidence of ephedrine usage among group A *(P value <0.001) (table 4).*

Table (4): Ephedrine administration

Ephedrine use	Group						Chi-Square	
	Group A		Group B		Total			
	N	%	N	%	N	%	X^2	P-value
No	12	60.00	20	100.00	32	80.00	22.937	<0.001*
Yes	8	40.00	0	0.00	8	20.00		
Total	20	100.00	20	100.00	40	100.00		

Table (5): Comparison between groups according to VAS scale.

VAS scale	Group A (n=20)	Group B (n=20)	z-test	p-value
Before injection Median (IQR) Range	3 (2-3) 2-3	2.5 (2-3) 2-3	0.095	0.759
After 15min. Median (IQR) Range	2 (2-3) 1-3	2 (2-3) 1-3	0.079	0.780
After 30min. Median (IQR) Range	2 (1.25-2) 1-3	2 (2-2) 1-3	0.281	0.599
After 45min. Median (IQR) Range	2 (1.25-2) 1-2	2 (1-2) 0-2	0.369	0.547
After 60min. Median (IQR) Range	1 (1-2) 0-2	1 (1-2) 0-2	0.233	0.632
After 1hr. Median (IQR) Range	1 (1-1) 0-2	1 (1-2) 0-2	0.288	0.291
After 2hr. Median (IQR) Range	1.5 (1-3) 1-3	1 (0-1) 0-2	0.631	0.729
After 3hr. Median (IQR) Range	2 (2-3) 1-3	1 (1-2) 0-3	1.003	0.569
After 4hr. Median (IQR) Range	2.4 (3-3) 2-3	2 (0-3) 0-3	0.665	0.714
After 5hr. Median (IQR) Range	2 (1-2) 1-2	1.3 (0-2) 0-2	0.509	0.781
After 6hr. Median (IQR) Range	2 (2-2) 2-2	1 (1-2) 1-2	1.238	0.468
After 7hr. Median (IQR) Range	2 (2-2) 2-2	1.5 (0-2) 0-2	1.875	0.194

*z-Mann-Whitney test; Data are expressed median and Interquartile range (IQR)p-value >0.05 NS; *p-value <0.05 S; **p-value <0.001 HS*

This table shows no statistically significant difference between group A from group B according to VAS scale from after 1hr to after 7hrs.

Postoperative Side effects

The incidence of one or more side effect such as sedation, dizziness, nausea and/or vomiting was higher

in the group A compared to group B with a statistically significant difference (*P- value 0.05*) *(table 6).*

Table (6): Incidence of side effects:

Side effect	Group						Chi-Square	
	Group A		Group B		Total			
	N	%	N	%	N	%	X^2	P-value
No	15	75.0	19	95.0	34	85.0	3.606	0.05*
Yes	5	25.0	1	5.0	6	15.0		
Total	20	100.00	20	100.00	40	100.00		

Postoperative urinary retention

Regarding postoperative urinary retention, there was significantly higher incidence of urinary retention in group A *(P-value < 0.001) (table 7).*

Table (7): Urinary retention:

Urinary Retention	Group						Chi-Square	
	Group A		Group B		Total			
	N	%	N	%	N	%	X^2	P-value
No	15	75.0	20	100.0	35	87.5	10.631	<0.001*
Yes	5	25.0	0	0.0	5	12.5		
Total	20	100.00	20	100.00	40	100.00		

4. Discussion

Total knee replacement surgery is associated with severe postoperative pain. Inadequate analgesia can produce unnecessary distress, suboptimal knee mobilization and medical complications due to immobility. These factors are likely to delay rehabilitation. A number of analgesic strategies have been adopted to minimize pain after knee arthroplasty. Studies suggest that regional techniques provide superior pain relief and faster postoperative knee rehabilitation than systemic analgesia. Until relatively recently, regional techniques have largely been confined to epidural or spinal approaches. However, peripheral neural blockade has been shown to provide effective analgesia with potentially less morbidity than central neuraxial techniques ***(Davies et al., 2004).***

This study was conducted on 40 patients ASA I-III undergoing unilateral total knee replacement surgery to compare efficacy, side effects, opiate consumption and hemodynamic effects of femoral nerve block placed under ultrasound guidance versus epidural analgesia.

In the present study we found statistically significant difference in the mean arterial blood pressure measured post injection of local anaethetic with more drop in group A (epidural analgesia) than group B (femoral nerve block). Also there was significant increase in heart rate from baseline readings in group **A** compared to group **B**.

The incidence of ephedrine administration intra-operatively was found to be statistically significant being higher in group **A** compared to group **B**.

The results in this study agree with a study by ***Capdevila and coworkers in 1999*** who tested the hypothesis that postoperative analgesic techniques influence surgical outcome and the duration of convalescence. In their study, 56 patients undergoing major knee surgery were randomly assigned to one of three groups, each to receive a different postoperative analgesic technique for 72 h: continuous epidural infusion, continuous femoral block, or intravenous patient-controlled morphine. The mean arterial blood pressure was found to be significantly lower in the continuous epidural infusion group at the PACU, 24 and 48 hours postoperatively being (67±7, 69±9 and 76±9 respectively) compared to the continuous femoral group (78 ±10, 77±11 and 78±9 respectively) and patient controlled analgesia group (79±7, 88±11 and 83±7 respectively).

Also the results in this study disagree with a study done by ***Shanthanna and his colleagues in 2012*** who compared ultrasound-guided continuous femoral nerve blockade versus continuous epidural analgesia for pain relief following total knee replacement. They recorded hypotension as a side

effect with higher percentage in the epidural group (4 out 19 patients) compared to the femoral group, however this was found to be statistically non-significant (P value 0.66). The incidence of common side effects (including hypotension) observed with CEA was lower in the CFB group by more than half. Although a statistical difference could not be achieved, which was justified by the authors, probably because of the small number of subjects.

In the present study we compared efficacy of analgesia between both groups using VAS. Patients were assessed in the PACU for 8 hours postoperative, Statistical analysis showed significant difference between both groups.

The results disagree with ***Barrington and his colleagues in 2005***who found no significant difference in pain scores between 2 groups: continuous femoral nerve block and continuous epidural analgesia in patients undergoing knee replacement surgery measured at rest, during continuous passive movement and during physiotherapy on post-operative days 1 and 2.

The results in this study also differ from the study by ***Davies et al. (2004).*** Their results showed that the median analgesic efficacy of both groups was greatest at discharge from recovery and at 6 h postoperatively. Pain scores were higher at the 24 and 48 h assessments in both groups. Median (95% CI) analogue scale scores were 0 (0–0), 15 (0–30), 55 (38–75) and 54 (30–67) mm for epidural block and 0.5 (0–22), 21.5 (10–28), 40 (20–50) and 34.5 (21–55) mm for combined block. VAS pain scores with the combined blocks were significantly lower at 24 h (P=0.004). These results could be attributed to their use of higher concentrations of bupivacaine (0.375%).

However in a study made by ***Sundarathiti et al.*** in ***2009*** to compare continuous epidural infusion (CEI) with continuous femoral nerve block (CFNB) regarding the postoperative analgesic efficacy, side effects, postoperative knee rehabilitation, and hospital length of stay. They found that pain scores in the CFNB group were significantly higher than those in the CEI group at postoperative 6-12 hours (P value of 0.001 and 0.004 respectively). Failure of the femoral block to block the sciaitc and obturator nerves may explain its decreased efficacy compared to CEI group.

Also ***Shanthanna et al. (2012)*** in their study found statistically significant difference in pain assessment using VAS at 6 hours postoperatively being 2.32 ± 1.1 in epidural group compared to 4.26 ± 1.09 in the femoral group (P value <0.001), after which there was a declining trend and scores were essentially similar from 24 h.

In the present study we found that incidence of side effects such as sedation, dizziness, nausea and/or vomiting were higher in group A compared to group B, regarding urinary retention there was significantly higher incidence in group A compared to group B.

The results in the present study agree with the study of ***Barrington et al. (2005)*** who stated that more patients in the CEA group than in the CFNB group suffered nausea or vomiting and that nausea score was higher in the CEA group compared with the CFNB group with a P value 0.007.

Our results also agree with those of ***Zaric et al. (2006),*** who found that urinary retention was more pronounced in the EPI group on the day of surgery (P=0.002) and the first postoperative day (P=0.001). The combined frequency of moderate and severe degrees of dizziness, pruritus, sedation, PONV, and urinary retention was higher in the EPI group on the first postoperative day (87% of patients had experienced one or more of these side effects as compared with the patients in the PNB group, where only 35% experienced side effects; P =0.0002).

The results also agree with the results of ***Sundarathiti et al. (2009)*** who stated that there was statistically significant increase in the incidence of PONV in CEI group compared to the CFNB group (P value 0.005, 0.005 and 0.031 in postoperative 6, 12 and 24 hours respectively). The incidence of urinary retention couldn't be assessed in the first 24 hours postoperatively due to the presence of urinary catheter.

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