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EPIDURAL CATHETERS AND LOCAL INFILTRATION ON RELIVING PAIN: A COMPARATIVE STUDY OVER KNEE REPLACEMEMT

Dr. Sai Baba S*

Assistant Professor, Department of Anaesthesia, RVS Nagar, RVS Institute of Medical Sciences, Chittoor, Andhra Pradesh, India.

ABSTRACT

Epidural analgesia and infiltration analgesia are difficult to use after total knee arthroplasty. Both techniques were compared in this study to determine which was more effective. The data was collected by random allocation between epidural (EA) and local infiltration (LIA) anesthesia for 60 patients with an average age of 65.7 years. Each patient under spinal anesthesia received an epidural catheter. A mixture of bupivacaine, ketorolac, morphine sulfate, and epinephrine was administered to the EA group, while normal saline injections were given to the LIA group. Using an epidural catheter, 25mg of bupivacaine diluted in 75mL of normal saline was administered via a patient-controlled analgesia (PCA) infusion pump after surgery. However, 100ml of normal saline was injected into the epidural catheter in the LIA group, blocking the PCA pump. It was not found that there was a significant difference in demographics between the two groups. A significant difference was found between the VAS scores of people in the EA group and those in the LIA group after surgery as they had greater pain until 12 hours after surgery. It was noticeable that the pain of the EA group was significantly lower than the pain of the LIA group by 24 hours, and by 48 hours, the difference was no longer significant. Hemoglobin drops and drain volume were lower in the LIA group. A superior range of motion in the knee was not found in the LIA or EA groups two weeks after surgery. The ability of patients to perform active straight leg raises one day after surgery was not significantly different between groups. Analgesia administered locally after surgery provided more pain relief than epidural analgesia 12 hours later. An epidural anesthesia control was better after 48 hours of postoperative pain. In terms of straight leg rising ability and knee range of motion, no significant differences were found between the two groups.

Keywords: Analgesia, Spinal anesthesia, Total knee replacement

INTRODUCTION

More than 70% of adults between the ages of 55 and 78 suffer from knee osteoarthritis [1]. An individual who experiences severe disability and has failed to respond to conservative treatments often requires a total knee arthroplasty (TKA). The postoperative pain that may result from TKA can affect the patient's rehabilitation despite its effectiveness for treating debilitating knee arthritis. A multimodal approach to pain management has resulted in significant improvements in the clinical outcomes of patients. In order to increase patients' satisfaction and function following TKA, pain control should be optimized. Analgesics must be administered postoperatively to avoid complications such as impaired rehabilitation, a prolonged hospital stay, pulmonary dysfunction, thromboembolism, myocardial ischemia, and urinary retention, all common side effects of inadequate analgesics. A growing body of evidence shows that postoperative pain management is highly effective. Narcotics can cause complications if taken to excess or when nerves are blocked.

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Corresponding Author: -. Dr. Sai Baba S

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Analgesia may be administered intravenously as patient-controlled analgesia (PCA). Opioid analgesics are used primarily in PCA for TKA. In addition to causing nausea, drowsiness, constipation, and respiratory depression, opioids can also interfere with rehabilitation.

The method has several advantages over other methods for managing pain. Researchers found that intraarticular administration of morphine, bupivacaine, epinephrine, and ketorolac reduced postoperative pain and improved knee range of motion [8, 9]. There is, however, controversy surrounding intraarticular analgesic injections. An independent randomized controlled trial conducted by Joo et al., demonstrated the effectiveness of multimodal drug injection after TKA. When compared with controls, intraoperative intraarticular injections of multimodal drugs into the knee did not significantly improve patient satisfaction, pain, blood loss, or range of motion.

Using the femoral nerve block (FNB) is the most effective method of managing postoperative pain following TKA. Despite the positive analgesic outcomes of FNB [11], surgeons are concerned about weakened quadriceps over extended periods of time. This complication can lead to falls, fractures, and delays in ambulation and there is a 2% chance it will occur [12]. Epidural catheters have shown better results than periarticular injections in alleviating pain

METHODS

The study included 60 patients (37% females, 40% males) met the criteria for primary TKA. Random allocations of 30 patients were done by using R's "R Program to Generate Random Numbers". In order to participate in the study, each patient had to provide written consent. Candidate who underwent bilateral or revision TKA as well as those who suffered from rheumatoid arthritis, collagen vascular disease, neuromuscular disease, hematological disease, or coagulopathy were excluded. Another patient refused to fill out the questionnaire, and two patients did not have working epidural catheters. A spinal anesthesiologist administered 4 mg of Marcaine 0.5% for each patient's anesthesia. In all cases, the same anesthesiologist inserted the epidural catheter. Additionally, the operation was conducted by one surgeon. A medial parapatellar arthrotomy was performed to access the joint. The same procedure was followed for bone cutting and balancing soft tissue. Prostheses were posteriorly stabilized in all patients During the operation, all patients were administered intravenous sedation by midazolam and fentanyl. Epinephrine (1 mg/1000), bupivacaine (4 mg), ketorolac (60 mg), and morphine sulfate (20 mg).were formulated into a mixture in the LIA group. An injection of 20 mL of the mixture was administered prior to polyethylene implantation. A sufficient amount of the substance was desired to be delivered into the tissues once the capsule of the joint was closed. In order to achieve maximum efficacy, fluid should be delivered to tissues as much as possible. It is best to use needles of 22 gauge in this case. It was especially important to aspirate the posterior midline of the knee prior to injection if that area was deemed potentially dangerous. During injection, the nurse drew up two syringes at the same time to deliver the solution. It is generally more effective to inject slowly, multiple times, and in small amounts.

Functional outcomes were assessed as follows:

Assessment of results

One day after surgery, the surgeon assessed the patients' ability to do SLR after measuring knee range of motion two weeks following surgery. In order to determine whether demographic factors such as gender, age, and body mass index (BMI) may affect outcomes, we compared the demographics of the two groups. The length of hospital stay also affects the cost-effectiveness of surgery.

A computer running Microsoft Windows was used for the statistical analysis. Statistics were calculated using SPSS 14 software (SPSS Inc., Chicago, IL, USA). Based on an independent-sample design, a t-test was performed between the two groups to compare continuous variables. The following parameters can be analyzed: age, body mass index, hospital stay, pain score, hemoglobin drops, and drainage volume, for instance. The Chi-square test and Fisher's exact test were used to analyze categorical SLR and gender variables. A statistically significant P-value is less than 0.05.

Outcomes

Patient demographics: all patients were compared based on their demographic characteristics. Epidural group patients had an average age of 66 years six months and Local group patients had an average age of 65.3 years seven months. Among 23 women and 7 men who received epidurals and 24 women and 6 men who received LIAs, A total of 24 women and 6 men participated. Except for gender, age, and BMI, clinical characteristics were similar between the two groups (Table 1). The EA group had 30 patients, while the LIA group had 30 patients. Table 1 compares the demographic characteristics of the two groups. There were no significant differences between the two groups in terms of gender, age, and BMI (table 1). Within 48 hours after surgery, pain intensity was measured using a VAS ruler to assess the severity of the patients' pain. At 1 hour, 6 hours, and 12 hours after surgery, the VAS scores of EA were significantly higher than those of LIA (P-value=0.009).

Table 1: Both groups had similar demographic characteristics.

Group studies	**Anesthesia through epidurals (30 participants)**	**The localization of terrorism Anesthetics (N=30)**	**Value of P**
Men	7	6	
Woman	23 (76.8)	24 (78)	
Infancy	66 ± 6.66	65.3 ± 7.66	0.99
Body Mass Index	29 ± 2.77	29.5 ± 2.33	0.477

Blood loss was measured using the postoperative drainage volume. Twenty-four hours after surgery, LIA was statistically significantly different from control groups. Also, three days after surgery, hemoglobin drops were lower in LIA groups than EA groups (P-value = 0.0001). Post-surgery comparisons of knee range of motion show no statistical difference between LIA and EA groups (P-value = 0.499). After surgery, patients underwent surgery the following day. Active straight leg raises were measured by the surgeon. In the LIA group, SLR was significantly different from SLR one day after surgery (P-value=0.1).

Table 2: Infiltrative and epidural groups were assessed using Visual Analogue Scales (VAS).

Group studies	**Anesthesia through epidurals (N=30)**	**As terrorism becomes more localized 30 patients were anesthetized**	**Probability**
After surgery, 1 hour	8.3 ± 1.03	7.63 ± 0.88	0.008*
After surgery, six hours later	8.77 ± 0.97	8.13 ± 0.55	0.002*
After surgery, 12 hours later	7.27 ± 0.95	6.4 ± 0.66	0.0002*
After surgery, 24 hours	5.77 ± 0.93	5.4 ± 0.44	0.033
After surgery, 48 hours later	4.3 ± 0.78	4.73 ± 0.63	0.022*

Table 3: After the surgery, the draining volume drops 24 hours later and the hemoglobin level drops 3 days later.

Group studies	Anesthesia through epidurals Among 30 participants	The localization of terrorism (30 subjects) anesthesia	Estimation of P
Blood drops with hemoglobin	2.66 ± 0.88	2.02 ± 0.3	0.0002
Quantity of drains	155 ± 43.6	133 ± 44.5	0.0002

Table 4: In two weeks after surgery, the patient is able to perform SLR and have a full range of motion in her knees.

Group studies	Epidural Anesthesia (N=30)	(N=30) Anesthesia during local infiltration	Estimation of P
Definitely	7 (23.3)	13 (43.3)	
Using SLRs			0.1
Not at all	23 (76.7)	17 (56.7)	
ROM of the knee	94.8 ± 10.4	93 ± 10.1	0.499

DISCUSSION

TKA was performed under spinal anesthesia in both the LIA and EA groups using a pain control infusion pump. Functional and pain outcomes were compared between the two groups. As a result, these factors had no influence on the findings, and neither did the male-to-female ratio or the age of the two groups. This assumption was not verified by measuring BMI, which was intended to reduce blood loss and postoperative pain. After surgery, VAS scores for the EA group were significantly higher than those for the LIA group at 1 hour, 6 hours, and 12 hours. After 24 hours, neither group differed significantly in VAS scores. However, the VAS scores of the EA and LIA groups were lower 48 hours postoperatively. A variety of types of anesthesia (antagonists) act on a variety of receptors, including adrenergic, serotonin, muscarinic, opioid, and N-methyl-D-aspartate (NMDA). This medication is helpful in managing pain associated with preoperative, intraoperative, and postoperative surgery [15]. An experiment by Adam et al [16] demonstrated that benzodine (0.5 mg/kg) increased knee range of motion. It is typically used for intra-articular (IA) analgesia because of its long-lasting anesthetic properties and extended duration of action (4–7 h). It is also possible to achieve greater effectiveness when ketamine is combined with bupivacaine. Motor function is not adversely affected and fewer side effects are experienced by those taking this medication. Based on their results [17], Inanoglu et al

concluded that the use of ketamine and bupivacaine (multimodal regimen) was an effective treatment for tonsillitis pain after tonsillectomy. Using ketamine and bupivacaine to manage pain following arthroscopic knee surgery were evaluated in a pilot study by Batra et al [18]. With femoral nerve blocks (FNBs) with local anesthetics, blood flow is improved compared to traditional IV PCAs with opioids. The opposite leg is not blocked by FNB as it is with epidural analgesia. In addition to preventing epidural hematoma, FNB is also less likely to cause postoperative hypotension and urinary difficulty than anticoagulants used to prevent vascular thromboembolism. Anesthesiologists must perform this procedure and may lead to weakness of the femoral quadriceps muscle, making it difficult to walk and causing fall risks. [19, 20]. The simplicity of LIA makes it an ideal pain control method over the use of epidural catheters, which require extensive equipment. The LIA is faster and easier to perform than femoral nerve blocks. The leg motor function is generally less impaired after a femoral nerve block, for example. The effectiveness of LIA for the treatment of postoperative pain following TKA has been widely documented [12, 17], but few studies have compared LIA and EA. There were two groups of patients participating in Binici's clinical trial. In group 1 (n=15), 72mL of 0.9% NaCl and 48mL of bupivacaine were administered through an epidural catheter over a 24 hour period. A total of 15 infiltration pumps were employed for group 2 (n=15). At 30 minutes, 8 hours, and 12 hours after surgery, neither the mean VAS score nor the difference in the mean VAS score showed significant differences. A significant difference (26 points) was observed between group 1 and group 2 after 60 minutes and 2 hours postoperatively. It was interesting to note that after 48 hours postoperatively, epidural patients' VAS scores were significantly lower than those without. At rest, epidural analgesia patients had lower pain scores than those on systemic analgesia; however, the difference was not significant at 18 to 24 hours following surgery. Analyzing the incidence of adverse events against pain relief is necessary. There are some downsides to the femoral nerve block, such as the weakness of the quadriceps and the need for an anesthesiologist to insert a catheter in the popliteal fossa. It was found that LIA is similar to femoral nerve blocks when it comes to pain control, but there is no motor block and no adverse effects on function with LIA. In the study, it was found to be a suitable alternative to femoral nerve blocks. There are, however, several side effects associated with epidural analgesia, including urinary retention, perioperative hypotension, respiratory depression, and pruritus. Furthermore, there is a tendency for ambulation and sensation to be impaired in the leg that was not surgically operated on; consequently, early physiotherapy following TKA may need to be interrupted when these problems occur. Also, epidural analgesia may delay anticoagulation therapy, which prevents thromboembolism. There might be a difference in the local injection cocktail due to epinephrine. Combined analgesics were injected into the soft tissue surrounding the joints of both groups using intraarticular catheters. Thus, the intraarticular drain was not able to decrease analgesic drugs. The knee function was also assessed along with straight leg lift ability and knee range of motion. It is necessary to administer injections the next day after surgery. After catheter removal on the 2nd day following surgery, LMWH is administered 12 hours after the catheter is removed, and no further LMWH is administered for at least 2 hours afterward. The second day after surgery, epidural hematomas are prevented by this procedure. To remove CNBs or epidural catheters after the last LMWH prophylactic dose, patients should wait 12 hours. To administer this medication, it is best to do so the evening before or after surgery. In the two to four hours following removal of the catheter or CNB, LMWH should not be administered.

CONCLUSION

Infiltration analgesia proved more effective for controlling pain after surgery than epidural analgesia. Epidural analgesia was found to be more effective at controlling postoperative pain after surgery. Straight-leg standing with similar range of motion was possible in both groups.

REFERENCES

1. Aweid O, Haider Z, Saed A, Kalairajah Y. *et al.*, Treatment modalities for hip and knee osteoarthritis: A systematic review of safety. *J Orthop Surg (Hong Kong).* 26(3),2018, 2309499018808669.
2. Zhang W, Moskowitz RW, Nuki G, Abramson S, Altman RD, Arden N, Bierma-Zeinstra S, Brandt KD, Croft P, Doherty M, Dougados M, Hochberg M, Hunter DJ, Kwoh K, Lohmander LS, Tugwell P. *et al.*, OARSI recommendations for the management of hip and knee osteoarthritis, part I: critical appraisal of existing treatment guidelines and systematic review of current research evidence. *Osteoarthritis Cartilage*. 15(9), 2007, 981-1000.
3. Fang R, Liu Z, Alijiang A, Jia H, Deng Y, Song Y, Meng Q. *et al.,* Efficacy of Intra-articular Local Anesthetics in Total Knee Arthroplasty. *Orthopedics.* 38(7), 2015, e573-81.
4. Kurosaka K, Tsukada S, Seino D, Morooka T, Nakayama H, Yoshiya S. *et al.*, Local infiltration analgesia versus continuous femoral nerve block in pain relief after total knee arthroplasty: a randomized controlled trial. *J Arthroplasty.* 2016, 31, 913-7.

5. Goyal N, McKenzie J, Sharkey PF.*et al.,* The 2012 Chitranjan Ranawat award: intraarticular analgesia after TKA reduces pain: a randomized, double-blinded, placebo-controlled, prospective study. *Clin Orthop Relat Res*. 2013, 471(1), 64-75.
6. Moucha CS, Weiser MC, Levin EJ. *et al.,* Current strategies in anesthesia and analgesia for total knee arthroplasty. *J Am Acad Orthop Surg*. 24(2), 2016, 60-73.
7. Sharma S, Iorio R, Specht LM, Davies-Lepie S, Healy WL. *et al.,* Complications of Femoral Nerve Block for Total KneeArthroplasty. *Clin Orthop Relat Res*. 468(1), 2010, 135-40.
8. Fajardo M, Collins J, Landa J, Adler E, Meere P, Di Cesare PE. *et al.,* Effect of a perioperative intra-articular injection on pain control and early range of motion following bilateral TKA. *Orthopedics.* 34(5), 2011, 354.
9. Joo JH, Park JW, Kim JS, Kim YH. *et al.,* Is Intra-Articular Multimodal Drug Injection Effective in Pain Management After Total Knee Arthroplasty? *J Arthroplasty*. 26(7), 2011, 1095-9.
10. Fischer HB, Simanski CJ, Sharp C, Bonnet F, Camu F, Neugebauer EA, Rawal N, Joshi GP, Schug SA, Kehlet H; *et al.*, PROSPECT Working Group. A procedure-specific systematic review and consensus recommendations for postoperative analgesia following total knee arthroplasty. *Anaesthesia.* 63(10), 2008, 1105-23.
11. Kandasami M, Kinninmonth AW, Sarungi M, Baines J, Scott NB. Femoral nerve block for total knee replacement - a word of caution. *Knee*. 16(2), 2009, 98-100.
12. Beaulieu P, Babin D, Hemmerling T: *et al.,* The pharmacodynamics of ropivacaine and bupivacaine in combined sciatic and femoral nerve blocks for total knee arthroplasty. *Anesth Analg*. 103(3), 2006, 768-74.
13. Ilfeld BM, Duke KB, Donohue MC. *et al.,* The association between lower extremity continuous peripheral nerve blocks and patient falls after knee and hip arthroplasty. *Anesth Analg*. 111(6), 2010, 1552-4.
14. Jouguelet-Lacoste J, La Colla L, Schilling D, Chelly JE: *et al.,* The use of intravenous infusion or single dose of low-dose ketamine for postoperative analgesia: a review of the current literature. *Pain Med.* 16(2), 2015, 383-403.
15. Zhang Y, Lin H and Yi WB: *et al.,* Evaluation of the effects of ketamine on spinal anesthesia with levobupivacaine or ropivacaine. *Exp Ther Med.* 12(4), 2016, 2290-2296.
16. Adam F, Chauvin M, Du Manoir B, Langlois M, Sessler DI, Fletcher D: *et al.,* Small-dose ketamine infusion improves postoperative analgesia and rehabilitation after total knee arthroplasty. *Anesth Analg*. 100(2), 2005, 475-80.
17. Inanoglu K, Ozbakis Akkurt BC, Turhanoglu S, Okuyucu S, Akoglu E: *et al*., Intravenous ketamine and local bupivacaine infiltration are effective as part of a multimodal regime for reducing post- tonsillectomy pain. *Med Sci Monit*. 15(10), 2009, CR539-543.
18. Batra YK, Mahajan R, Bangalia SK, Nagi ON, Dhillon MS. *et al.,* Bupivacaine/ketamine is superior to intra-articular ketamine analgesia following arthroscopic knee surgery. *Can J Anaest*h. 52(8), 2005, 832- 6.
19. Ben-David B, Chelly JE. Continuous peripheral neural blockade for postoperative analgesia: practical advantages. *Anesth Analg.* 96(5), 2003,1537.
20. Seet E, Leong WL, Yeo AS, Fook-Chong S. *et al.,* Effectiveness of 3- in-1 continuous femoral block of differing concentrations compared to patient controlled intravenous morphine for post total knee arthroplasty analgesia and knee rehabilitation. *Anaesth Intensive Care*. 34(1), 2006, 25-30..