Is Multimodal pain management the new standard of care in total knee replacement?

Dr. Vijayaraja, Dr. Ganesan G Ram, Dr. Faraz Ahmed and Dr. Raghavendran

DOI: https://doi.org/10.22271/ortho.2018.v4.i4d.3

Abstract

Background: Measures for pain management after total knee arthroplasty (TKA) are important for early improvement in the quality of life after operation and early postoperative rehabilitation. This study was conducted to evaluate whether multimodal drug therapy with periarticular joint injection is better than conventional combined epidural and spinal in total knee arthroplasty (TKA).

Methods: 40 patients undergoing TKA for osteoarthritis were divided into two groups. Group A (20 knees; control group), this group underwent surgery under combined spinal and epidural analgesia. While group B (20 knees) underwent surgery under spinal combined with intra-articular injection of multimodal drug cocktail. All analgesics administered post-operatively were recorded. The evaluation of pain was done using visual analogue scale (VAS).

Results: The VAS scores on post-operative days 0, 2, 5 were low in group B compared to group A. The usage of analgesics post-operatively was high in group A. The level of pain control was higher in group B than in group A.

Conclusion: Intraoperative periarticular injection with multimodal drugs can significantly reduce the requirements for patient-controlled analgesia and improve patient satisfaction, with no apparent risks, following total knee arthroplasty.

Keywords: Total knee replacement, pain score, visual analogue scale, knee cocktail, bupivacaine

Introduction

Pain management plays an essential role in the postoperative period for the patients undergoing Total knee arthroplasty. The problem of acute postoperative pain is widespread with approximately 40% of all surgical patients experiencing moderate-severe acute postoperative pain [1]. Controlling postoperative pain after joint arthroplasty is especially important as it relates to patient satisfaction and outcomes [2]. Perioperative pain management for patients undergoing TKA influences length of stay, rehabilitation progress and functional outcome [3]. Usually patient’s pain will be managed either by Spinal anesthesia, femoral block, opioids, continuous epidural pump, intra-articular cocktail, intravenous analgesics and pain patches. The aim of the study is to assess the postoperative pain management using multimodal therapy versus combined spinal and epidural anesthesia.

Materials and Methods

This was a prospective cohort study done at Sri Ramachandra Medical Centre between August 2017 and August 2018. The study protocol was approved by institutional ethics committee. Inclusion criteria included all patients undergoing total knee replacement with grade 3 and grade 4 primary osteoarthritis knees. Exclusion criteria included those patients undergoing revision surgery or who declined consent, major neurological problems, previous drug dependency, allergies to any of the ingredients of the injection, renal insufficiency, abnormal liver enzymes, a history of stroke or a major neurological deficit, or uncontrolled angina. We had 40 patients who took part in the study. Exactech Cruciate retaining implant was used in all patients. Pre operatively the patients were divided into two groups chosen by card method. Group A we had 20 patients who underwent surgery under combined spinal and epidural anesthesia and group B had 20 patients who underwent surgery under spinal anesthesia with intraarticular cocktail drug.
The mean age in group A was 59.1 years and group B was 58.7 years. We had nine males and eleven females in group A and eight males and twelve females in group B. We had sixteen patients having grade 3 osteoarthritis and four patients having grade 4 osteoarthritis in group A while group B had eighteen patients having grade 3 and two patients having grade 4 osteoarthritis.

The patients in group A underwent surgery under combined spinal and epidural anesthesia. While group B patients underwent surgery under spinal anesthesia and intra-articular knee cocktail containing 30 ml mixture [containing 0.5% bupivacaine (20 ml), ketanov (1 ml), 0.3 mg of epinephrine (0.3 ml), and sterile normal saline (8.7 ml)]. Total knee replacement was performed through standard medial parapatellar approach [4]. Patients in both groups received injection. Paracetamol 1gm thrice a day from day 0 post operative day. Injection Ketanov 30mg was added as SOS for both groups. We prescribed a proton pump inhibitor (omeprazole) to all patients undergoing TKA to prevent a stress ulcer. Joint at rest was assessed preoperatively, and then on postoperative days. Participants rated the severity of their joint pain at rest and the sensory qualities of their joint pain. A visual analog scale (VAS) [5, 6] was used to assess pain at 4 hours after surgery, 0 and on 2nd, 5th post operative days.

Results
The mean VAS scores on the day of surgery for group A was 6 and for group B was 4. The mean VAS scores on 2nd post operative day for group A was 3 and group B was 2. The mean VAS scores on 5th post operative day for group A was 1, for group B was 1. Injection Ketanov 30mg was given for 8 patients in group A and no patients in group B received during the first post operative period.

| Post op Day | Mean VAS score Group A | Mean VAS score Group B |
|-------------|------------------------|------------------------|
| 0           | 6                      | 4                      |
| 2           | 3                      | 2                      |
| 5           | 1                      | 1                      |

Discussion
In Total knee arthroplasty the Postoperative pain is the major concern and the best standard care remains controversial. Intravenous opioids, extra-articular and intra-articular injection, epidural analgesia and femoral or sciatic nerve blocks are currently used for postoperative pain management. However each drug has its own side effects. Femoral or sciatic block can diminished muscle control and possible nerve damage while opioids can cause vomiting, dizziness and epidural analgesia causes side effects like urinary retention and spinal headache.

In this study, we compared VAS scores for group B against control group A. From Table 1 We found that periarticular anesthetic cocktail injection controls pain much better than the conventional combined spinal and epidural. The VAS score for pain gradually decreases from 6 in the first postoperative day to 3 at 48 hours after surgery in group A while it was 4 and 2 in group B respectively. All patients were able to walk with a walker the next morning and were discharged to their homes by the fifth day after surgery. Injection Ketanov 30mg was given for 8 patients in group A and no patients in group B received during the first post operative period. The consumption of analgesic drugs during post operative period in both groups showed that Group A consumed substantially more analgesics than Group B. The analgesic effect of cocktail drug may last up to 48 hours. Several studies have reported the efficacy and safety of periarticular multimodal drug injections after TKA. No complications related to the infiltration of the local anesthetic were observed, and all plasma concentrations of the local anesthetic were below toxic range [7]. Bupivacaine has a longer effect and less cardiac and central nervous system toxicity [8]. In our cocktail, we used bupivacaine [9, 3, 10] and bupivacaine has been reported as safe and effective for local infiltration [11]. Ketorolac used in this study is reportedly effective for postoperative pain control, 30 milligrams of ketorolac is as effective as 12 mg morphine [12]. No side effects such as gastrointestinal bleeding were observed. This study revealed that intra-articular cocktail analgesic injection reduced the need for morphine and offered a better pain control, without apparent risks following TKA. The findings from this study have limited generalisability because they are specific to the anesthetic and analgesia used in this study. This study shows that periarticular injection with the use of multimodal drugs is an efficient alternative [13] for postoperative analgesia in TKA.

Conclusion
Intraoperative periarticular injection with multimodal drugs can significantly reduce the requirements for patient-controlled analgesia and improve patient satisfaction, with no apparent risks, following total knee arthroplasty.

Acknowledgements: Nil

Funding: None

Conflict of interest: None declared

References
1. Wylde V, Rooker J, Halliday L, Blom A. Acute postoperative pain at rest after hip and knee arthroplasty: Severity, sensory qualities and impact on sleep. Orthop Traumatol Surg. Res. 2011; 97(2):139-44.
2. Sporer SM, Rogers T. Postoperative Pain Management after Primary Total Knee Arthroplasty: The Value of Liposomal Bupivacaine. J Arthroplasty. 2016; 31(11):2603-2607.
3. Yu S, Szulc A, Walton S, Bosco J, Iorio R. Pain Control and Functional Milestones in Total Knee Arthroplasty: Liposomal Bupivacaine versus Femoral. Clin Orthop Relat Res. 2017; 475(1):110-117.
4. Mark D, Kohn BA, Adam A, Sassoon MD, Navin D, Fernando MD. Classifications in Brief Kellgren-Lawrence Classification of Osteoarthritis Clin. Orthop Relat Res. 2016; 474:1886-1893.
5. Marco Sanna, Cristina Sanna, Francesco Caputo, Giuseppe Piu, Massimiliano Salvi. Surgical approaches in total knee arthroplasty. Joints. 2013; 1(2):34-44.
6. Hawker GA, Mian S, Kendzerska T, French M. Measures of adult pain: Visual Analog Scale for Pain (VAS Pain), Numeric Rating Scale for Pain (NRS Pain), McGill Pain Questionnaire (MPQ), Short-Form McGill Pain Questionnaire (SF-MPQ), Chronic Pain Grade Scale (CPGS), Short Form-36 Bodily Pain Scale (SF-36 BPS), and Measure of Intermittent and Constant Osteoarthritis Pain (ICOAP), Arthritis Care Res (Hoboken). 2011; 63(11):S240-52.
7. Carol Boding A, Dr. PH Gordon Freedman MD, Sabera
Hossain MS, James Eisenkraft B MD, Yaakov Beilin MD. The Visual Analog Scale for Pain: Clinical Significance in Postoperative Patients. Anesthesiology. 2001; 95(6):1356-61.

8. Allen HW, Liu SS, Ware PD, Nairn CS, Owens BD. Peripheral nerve blocks improve analgesia after total knee replacement surgery. Anesth Analg. 1998; 87(1):93-7.

9. Vendittoli PA, Makinen P, Drolet P, Lavigne M, Fallaha M, Guertin MC, et al. A multimodal analgesia protocol for total knee arthroplasty. A randomized, controlled study. J Bone Joint Surg Am. 2006; 88(2):282-9.

10. Scott DB, Lee A, Fagan D, Bowler GM, Bloomfield P, Lundh R. Acute toxicity of ropivacaine compared with that of bupivacaine. Anesth Analg. 1989; 69(5):563-9.

11. Parvataneni HK, Shah VP, Howard H, Cole N, Ranawat AS, Ranawat CS. Controlling pain after total hip and knee arthroplasty using a multimodal protocol with local periarticular injections: a prospective randomized study. J Arthroplasty. 2007; 22(6-2):33-8.

12. Nattapol Tammachote MD, MSc, Supakit Kanitnate MD, Phonthakorn Panichkul MD. Is Pain After TKA Better with Periarticular Injection or Intrathecal Morphine?. Clin Orthop Relat Res. 2013; 471(6):1992-1999.

13. Fu P, Wu Y, Wu H, Li X, Qian Q, Zhu Y. Efficacy of intra-articular cocktail analgesic injection in total knee arthroplasty - a randomized controlled trial. Knee. 2009; 16(4):280-4.

14. Joseph Lamplot DBS, Eric Wagner RMD, David Manning WMD. Multimodal Pain Management in Total Knee Arthroplasty: A Prospective Randomized Controlled Trial. The Journal of Arthroplasty. 2014, 29(2).