Original Article

ISSN (O): 2456-7388; ISSN (P): 2617-5479

Choice for Post-Operative Pain – Fentanyl or Acetaminophen? A Randomized Control Study

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Abstract

Background: Pain a common complaint often reported by post-operative cases. Fentanyl is one of the widely used short-term and rapid-response opioid drugs with addictive nature. Acetaminophen and another widely used pain killer without addictive property. Hence, this study was planned to compare the efficacy of fentanyl and acetaminophen in terms of reducing post-operative pain. **Subjects and Methods :** This randomized controlled trial was carried out in the department of anesthesiology among the surgical patients admitted in Sri Muthukumaran Medical College Hospital and Research Institute, Chennai from January 2019 to June 2019. A total of eighty cases were included and they were randomized and divided into two groups with forty cases in each group where group A received the drug fentanyl 1mcg/kg and group B received drug acetaminophen 1 gm intravenously during the second hour of their post-operative period. The pain was assessed using the VAS score. Results were analyzed using the Statistical Package for Social Sciences (SPSS) version 17. **Results:** Both fentanyl and acetaminophen groups were similar in terms of age, gender, different surgical procedures and complaints with no statistically significant difference, noted. However, postoperative pain scores were comparatively less in the fentanly group compared to the acetaminophen group during the sixth and twelfth postoperative hour but the pain scores were similar in both the groups at the twenty-fourth postoperative hour. **Conclusion:** Fentanyl can be used for the management of postoperative pain compared to acetaminophen, which reported comparatively fewer complaints.

Keywords: Fentanyl, Acetaminophen, Post-Operative Pain, Paracetamol

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Received: 16 October 2020 **Revised: 30 October 2020** **Accepted: 08 November 2020** **Published: 16 December 2020**

Introduction

Pain is the most common complaint often reported by post-operative cases and remains a challenge to the anesthesiologists.[1] Pain due to the surgical incision is somatic, thus conventional opioids are predominantly used for its management. But the use of opioid drugs is more commonly associated with adverse effects like apnea, cardiovascular complications, nausea, vomiting, gastrointestinal discomfort and also the known fact is that it is associated with drug-dependent if it is used for a longer time.[2–4]

Fentanyl is one of the widely used short-term and rapid-response opioid drugs. It is a fat-soluble drug, which can be administered intramuscularly, intravenously or through intranasal routes.[5] It can also be used through neuraxial, mucosa and cutaneous routes as well. All opioids are metabolized in the liver and thus cause liver disorders with disproportionate doses.[1]

Acetaminophen or paracetamol another widely used pain killer that works by inhibiting cyclooxygenase 2 (cox-2) in the central nervous system (CNS) and inhibiting a putative central cyclooxygenase 'COX-3' that is selectively susceptible to it.[6] It was found to prevent prostaglandin production at the cellular transcriptional level, independent of cyclooxygenase activity.[7] Paracetamol is therefore an effective postoperative analgesic, with potency slightly less than a standard dose of fentanyl.[8] Also, the incidence of adverse effects of paracetamol was relatively less and it is not an addictive drug.[9] Hence this study was planned to compare the efficacy of fentanyl and acetaminophen in terms of reducing post-operative pain.

Objectives

To compare the effectiveness of fentanyl and acetaminophen in reducing postoperative pain in a tertiary care center

Subjects and Methods

This randomized controlled trial was conducted in the department of anesthesiology among the adult patients admitted in the different surgical departments like General Surgery, ENT, Orthopedics and Gynecology in Sri Muthukumaran Medical College Hospital and Research Institute, Chennai from January 2019 to June 2019. Patients who were more than 18 years of age were selected for the study. The study participants also met the inclusion criteria of coming under the American Society of Anesthesiologists (ASA) grade I and II and they also were undergoing elective surgical procedures. Pregnant and lactating mothers were excluded from the study. A total of eighty cases were included in this study.

Before the start of the study, informed consent was obtained from each of the patients. The study patients were randomly divided into two groups with forty cases in each group. Patients in group A received the drug fentanyl 1mcg/kg and group B received drug acetaminophen 1 gm intravenously during the second hour of their post-operative period.

Following the administration of fentanyl and acetaminophen during the post-operative period, pain scores were assessed using the Visual Analog Scale (VAS) with scores from 0-100 at sixth, twelfth and twenty-fourth postoperative hours. Also, the patient's vital signs were recorded during the same period. Patients were given oral analgesics if the pain was not tolerable. All the observations were entered and recorded in the prepared proforma. The results were tabulated and analyzed using the Statistical Package for Social Sciences (SPSS) version 17. To check the hypothesis, the chi-square test, independent sample t-test and z test were used appropriately. A P-value of less than 0.05 was considered significant.

Results

In this study in the group a there were 12.5%, 32.5%, 27.5%, 17.5% and 10% of cases belongs to age group 19-30 years, 31-40 years, 41-50 years, 51-60 years and more than 60 years, respectively whereas in group B there were 17.5%, 27.5%, 22.5%, 20% and 12.5% of cases belongs to age group 19-30 years, 31-40 years, 41-50 years, 51-60 years and more than 60 years. Also there were 57.5% and 42.5% of male and female participants in group A and 60% and 40% of male and female participants in group B. The difference in the proportion of cases concerning age and gender in group A and group B was found to be statistically insignificant [Table 1]. The proportion of cases that underwent surgery in different surgical departments is shown in [Figure 1].

On assessing the mean postoperative pain scores at 6 hours in group A and group B it was found to be 22.3 ± 12.7 and 28.5 ± 11.4, respectively. The difference in mean pain score at 6^{th} postoperative hour in group A and group B were found to be statistically significant (p=0.0243). At twelve hours of the post-operative period the pain scores in group A and group B were found to be 35.2 ±18.8 and 45.3 ±13.87, respectively. The difference in mean pain score at 12^{th} postoperative hour in group A and group B were analysed. It was established to be statistically significant (p=0.0077). At 24^{th} postoperative hour the pain score in group A and group B was found to be 47.5 ±13.18 and 51.93 ±10.71, respectively. The difference in mean pain score at 24^{th} postoperative hour in group A and group B was found to be statistically insignificant (p=0.1030). [Table 2]

The proportion of cases with complaints of chills and shivering, fever, vomiting and nausea in group A was found to be 12.5%, 5%, 2.5% and 12.5%, respectively whereas in group B it was found to be 5%, 2.5%, 5% and 7.5%, respectively. The overall proportion of complaints in group A and group B was found to be 25% and 20%, respectively and the difference in proportion between the two groups was found to be statistically insignificant (p=0.5946)

Table 1: Characteristics of patients in both groups

Variables	Group A (N=40)	Group B (N=40)	P-value
Age group			
19- 30 years	05 (12.5)	07 (17.5)	0.9277
31- 40 years	13 (32.5)	11 (27.5)	
41-50 years	11 (27.5)	09 (22.5)	
51-60 years	07 (17.5)	08 (20)	
> 60 years	04 (10)	05 (12.5)	
Sex			
Male	23 (57.5)	24 (60)	0.8203
Female	17 (42.5)	16 (40)	

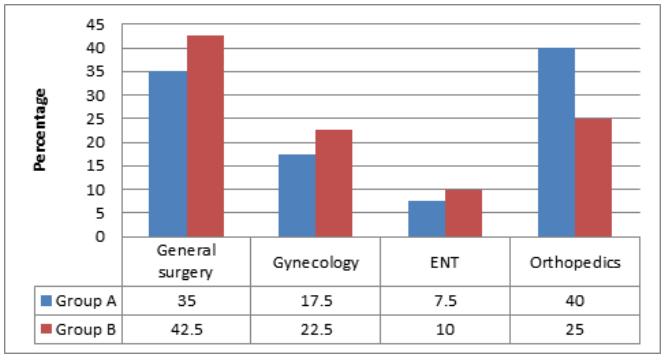

Figure 1: Proportion of cases underwent surgery in different surgical departments

Table 2: Comparison of different operative variables between the two groups

Variables	Group A	Group B	P-value
Post operative 6^{th} hour- Pain score	22.3 ± 12.7	28.5 ± 11.4	0.0243*
Post operative 12^{th} hour- pain score	35.2 ±18.8	45.3 ±13.87	0.0077*
Post operative 24^{th} hour- Pain score	47.5 ±13.18	51.93 ±10.71	0.1030

*Significant

Table 3: Proportion of cases with complaints

Complaints	Group A	Group B	P-value
Chills & shivering	5 (12.5)	2 (5)	0.2382
Fever	2 (5)	1 (2.5)	0.5587
Vomiting	1 (2.5)	2 (5)	0.5587
Nausea	5 (12.5)	3 (7.5)	0.4589
Total	10 (25)	8 (20)	0.5946

Discussion

The ideal analgesic drug is one with no dangerous adverse effects and the patient would be hemodynamically stable. [10] In this study, both fentanyl and acetaminophen groups were similar in terms of age, gender, different surgical procedures and complaints with no statistically significant difference, noted. However, postoperative pain scores were comparatively less in the fentanly group compared to the acetaminophen group during the sixth and twelfth postoperative hour but the pain scores were alike in both the groups at the twenty-fourth postoperative hour.

Sinatra et al, [11] reported that acetaminophen reduces pain, both moderate and severe after orthopedic surgery. It was also well-tolerated and imparted rapid and effective analgesia. Another study among cases that underwent lower segment cesarean section reported acetaminophen had better pain control compared to the ibuprofen group. [12]

Tsang et al, [13] did a study to see the opioid-sparing effects of acetaminophen in preoperative hip fracture patients, and they found that acetaminophen had a significant opioid-sparing effect. It was also found to have satisfactory pain relief in preoperative hip fracture patients.

Aghamir et al, [14] reported that acetaminophen is an effectual analgesic for acute postoperative pain management with minimal side effects. Peterson et al, [15] from his study, highlighted the fact that acetaminophen utilization led to lowered doses of narcotic analgesics being used during the postoperative period in coronary artery bypass grafting patients.

Rod et al, [16] conducted a study comparing Morphine and Propacetamol in the reduction of postoperative pain and reported that morphine dosages amongst children could be reduced with Propacetamol during their postoperative period.

A comparative study done by Alhashemi et al, [17] among children who underwent the procedure of tonsillectomy unveiled the fact that children treated with intravenous acetaminophen were less drowsy and discharged earlier from the hospital as compared with those who received intramuscular meperidine.

Conclusion

We conclude that fentanyl is significantly effective in reducing postoperative pain at the sixth and twelfth hours of the postoperative period compared to acetaminophen but the significance was not found during the 24 hours postoperative period. Though the acetaminophen group reported comparatively fewer complaints from the patients compared to the fentanyl group, the difference was found to be insignificant. Hence fentanyl can be used for the management of postoperative pain compared to acetaminophen.

Acknowledgment

I would like to extend my sincere gratitude to the medical superintendent, staff and study participants for their genuine support during the study.

References

1. Gan TJ. Poorly controlled postoperative pain: prevalence, consequences, and prevention. J Pain Res. 2017;10:2287–2298. Available from: https://dx.doi.org/10.2147/JPR.S144066.
2. Bakan M, Umutoglu T, Topuz U, Uysal H, Bayram M, Kadioglu H, et al. Opioid-free total intravenous anesthesia with propofol, dexmedetomidine and lidocaine infusions for laparoscopic cholecystectomy: a prospective, randomized, double-blinded study. Braz J Anesthesiol . 2015;65(3):191–199. Available from: https://doi.org/10.1016/j.bjane.2014.05.001.
3. Garimella V, Cellini C. Postoperative Pain Control. Clin Colon Rectal Surg. 2013;26(3):191–196. Available from: https://dx.doi.org/10.1055/s-0033-1351138.
4. Lovich-Sapola J, Smith CE, Brandt CP. Postoperative Pain Control. Surg Clin North Am. 2015;95(2):301–318. Available from: https://dx.doi.org/10.1016/j.suc.2014.10.002.
5. Kerr D, Taylor D, Evans B. Patient-controlled intranasal fentanyl analgesia: a pilot study to assess practicality and tolerability during childbirth. Int J Obstet Anesth. 2015;24(2):117–123. Available from: https://dx.doi.org/10.1016/j.ijoa.2014.11.006.

6. Bonnefont J, Courade JP, Alloui A, Eschalier A. Antinociceptive mechanism of action of paracetamol. Drugs. 2003;63:1–4.
7. Trettin A, Böhmer A, Suchy MT, Probst I, Staerk U, Stichtenoth DO, et al. Effects of Paracetamol on NOS, COX, and CYP Activity and on Oxidative Stress in Healthy Male Subjects, Rat Hepatocytes, and Recombinant NOS. Oxid Med Cell. 2014;2014:1–12. Available from: https://dx.doi.org/10.1155/2014/212576.
8. Power I. Recent advances in postoperative pain therapy. Br J Anaesth. 2005;95(1):43–51. Available from: https://dx.doi.org/10.1093/bja/aei037.
9. Toms L, Mcquay HJ, Derry S, Moore RA. Single dose oral paracetamol (acetaminophen) for postoperative pain in adults. Cochrane Database Syst Rev. 2008;2008(4):4602. Available from: https://doi.org/10.1002/14651858.cd004602.pub2.
10. Boezaart AP, Berry RA, Nell ML, van Dyk AL. A comparison of propofol and remifentanil for sedation and limitation of movement during periretrobulbar block. J Clin Anesth. 2001;13(6):422–426. Available from: https://dx.doi.org/10.1016/s0952-8180(01)00296-3.
11. Sinatra RS, Jahr JS, Reynolds LW, Viscusi ER, Groudine SB, Payen-Champenois C. Efficacy and Safety of Single and Repeated Administration of 1 Gram Intravenous Acetaminophen Injection (Paracetamol) for Pain Management after Major Orthopedic Surgery. Anesthesiol. 2005;102(4):822–831. Available from: https://dx.doi.org/10.1097/00000542-200504000-00019.
12. Alhashemi JA, Alotaibi QA, Mashaat MS, Kaid TM, Mujallid RH, Kaki AM. Intravenous acetaminophenvs oral ibuprofen in combination with morphine PCIA after Cesarean delivery. Can J Anaesth. 2006;53(12):1200–1206. Available from: https://doi.org/10.1007/bf03021581.
13. Tsang KS, Page J, Mackenney P. Can Intravenous Paracetamol Reduce Opioid Use in Preoperative Hip Fracture Patients?. Orthopedics. 2013;36(2):20–24. Available from: https://dx.doi.org/10.3928/01477447-20130122-53.
14. Aghamir SK, Mojtahedzadeh M, Alizadeh F, Alizadeh F, Khalili H, Sadeghi M, et al. Propacetamol vs. tramadol for post- operative pain management after urologic surgery. Int J Pharmacol. 2006;4:1–8.
15. Petterson PH, Jakobsson J, Owall A. Intravenous acetaminophen reduced the use of opioid compared with oral administration after coronary artery bypass grafting. J Cardiothorac Vasc Anesth. 2005;19:306–309. Available from: https://doi.org/10.1053/j.jvca.2005.03.006.
16. Rod B, Monrigal JP, Lepoittevin L, Granry JC, Cavellat M. Treatment of postoperative pain in children in the recovery room. Use of morphine and propacetamol by the intravenous route. Cah Anesthesiol. 1989;37:525–555.
17. Alhashemi JA, Daghistani MF. Effects of intraoperative i.v. acetaminophen vs i.m. meperidine on post-tonsillectomy pain in children. Br J Anaesth. 2006;96(6):790–795. Available from: https://dx.doi.org/10.1093/bja/ael084.

How to cite this article: Kumar MK. Choice for Post-Operative Pain – Fentanyl or Acetaminophen? A Randomized Control Study . Acad. Anesthesiol. Int. 2020;5(2):80-83.

DOI: dx.doi.org/10.21276/aan.2020.5.2.17

Source of Support: Nil, **Conflict of Interest:** None declared.