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ORIGINAL ARTICLE

Comparison of Tramadol Infusion Versus Tramadol Boluses for Postoperative Pain in Patients Undergoing Lower Abdominal Surgeries

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ABSTRACT

Background: The management of postoperative pain is one of the primary focuses in efforts to reduce postoperative morbidity. Analgesia that is managed by the patient is a superior method for pain treatment since it eliminates the risk of both drug overdose and addiction.

Objective: To compare the outcome with tramadol infusion versus tramadol boluses in patients undergoing lower abdominal surgeries.

Design: It was a randomized controlled trial.

Study Settings: Department of Anesthesiology, Doctor's Hospital and Medical Centre, Lahore from from 21-06-2020 to 20-12-2020.

Material and Methods: Using a random number table, the patients were divided equally between two groups. At the time of induction of general anaesthesia, patients in both groups received an initial loading dose of 1mg/Kg of tramadol through intravenous injection. While the infusion group had a tramadol infusion at 10mg/hr for 24 hours following surgery, the bolus group received a placebo solution (normal saline 0.9%) and patients only got boluses of 25 mg of tramadol on demand (VAS > 4) for up to 24 hours.. Patients were asked to complete a postoperative pain assessment after 24 hours had passed since surgery. When the VAS score was higher than 4, it was noted that analgesics were used.

Results: In Group-A, the mean pain score in the sixth hour was 5.42±0.61 while in Group-B, it was 5.30±1.18. At the 12th hour, Group A was at 5.60 ±0.99 and Group B was at 5.08 ±1.60. At the 18th hour, Group A was at 4.90± 1.37 and Group B was at 5.26± 1.16. At the 24th hour, Group A was at 4.28± 1.68 and Group B was at 5.02 ±1.12. Mean analgesia was 60.00±0.00 in group A and 61.64±14.68 in group B at the sixth hour (P>0.05). At the 12-hour mark, group A's mean analgesia was 117.50±11.88 and group B's was 104.80±21.88 (P 0.05). There was no statistically significant difference in analgesic consumption between the treatment groups at the 18th and 24th hours (p-values: 0.120 and 0.929 respectively).

Conclusion: In patients having lower abdominal operations, both tramadol administration methods are equally beneficial in reducing pain and analgesic use.

Keywords: Tramadol boluses, Tramadol Infusion, General Anaesthesia, Lower Abdominal Surgeries

INTRODUCTION

Clinical practices frequently fail to effectively address the subjective and multifaceted nature of pain. After anaesthesia and surgery, it's crucial to get your postoperative pain under control. Surgical pain is caused by inflammation from tissue trauma (such as a surgical incision, dissection, or burns) or direct nerve injury (i.e., nerve transection, stretching, or compression).[1] Patients experience pain via the afferent pain pathway, which can be modulated by numerous pharmacologic medications.[2]

Postoperative pain is proportional to the degree of tissue damage and the area of the body that was operated on. The term "pain experience" refers to the sum total of a person's sensory and affective reactions to experiencing pain.[3] A patient's mental and physical health can take a hit if they are unable to get adequate pain relief after surgery. Effective, well-tolerated analgesic medicines are urgently needed to reduce the harmful effects of untreated acute pain.[3,4]

It is widely agreed that patient-controlled analgesia (PCA) systems, which allow for on-demand opioid administration, are the superior method for administering systemic opioids for pain management.[5] In postoperative pain management, the most common method of administering analgesia is the use of repeated bolus on a regular basis or as needed. Tramadol is an atypical opioid used as an analgesic; it blocks noradrenaline reuptake and increases serotonin release.[6] This analgesic has a longer duration of action than diclofenac sodium and is just as safe to use after surgery. In addition, in contrast to other opioids, it does not lead to a decrease in the ability to breathe.[7]

A single dose of intravenous tramadol given 30 minutes before abdominal surgeries improves analgesia and reduces the need for morphine PCA when combined with a postoperative small-dose tramadol infusion, according to a randomised trial carried out in China. The mean pain score with bolus tramadol was 42±4.7 after 24 hours of surgery, which was significantly higher than tramadol infusion, which was 33±4.7 (P=0.000).Tramadol intake after 24 hours was 22.5(14.3-35.3)mg in the bolus group and 48.6 (32.2-63.9)mg in the infusion group (p=0.017).[8]

However, a local investigation found that after 24 hours post-surgery, the average pain score was the same in both the tramadol bolus and tramadol infusion groups (P>0.9999). After 24 hours, the infusion group had received 438±50mg of tramadol, while the bolus group had received 250±50mg (p=0.000).Continuous infusion is superior to bolus in terms of ease administration and better pain control during postoperative care, but it was also shown that there was less analgesia use in infusion group.[9]

The purpose of this research is to evaluate the effectiveness of tramadol boluses versus continuous infusion in reducing pain after lower abdominal surgery. Research has revealed that preoperative tramadol infusion is more effective than postoperative tramadol boluses at reducing pain experienced by patients. However, there is conflicting evidence suggesting that intravenous tramadol plays no part in managing pain after surgery. Therefore, the purpose of this research is to determine if intravenous tramadol is effective in easing the discomfort felt by patients after surgery.

MATERIAL AND METHODS

After receiving approval from the hospital's ethical committee the study was conducted at Surgery ward of Doctor's Hospital, Lahore. Demographic details name, age, sex, and type of surgery were collected. In patients undergoing lower abdominal surgeries, the sample size is calculated to be 100 cases, with 50 cases in each group. This is done with 80% power of study, 95% confidence level, and taking the magnitude of post-operative pain score into consideration, which is 42±4.75 with tramadol infusion and 33±4.75 with tramadol boluses. Non probability consecutive sampling method was used. One hundred patients having age 20

to 50 yrs of either gender with ASA I & II undergoing lower abdominal surgeries like total open prostatectomy, abdominal hysterectomy, inguinal hernioplasty, appendectomy, cystolithotomy and lower abdominal incisional hernioplasty, gynecological surgeries for tumor were enrolled. Patients with BMI >35kg/m^2, unable to interpret VAS, allergic to tramadol, on long term opioids were excluded.

The patients were then split into two groups in a completely arbitrary manner using a random number table. At the time of induction of general anaesthesia, patients in both groups received an initial loading dose of 1mg/Kg of tramadol through intravenous injection. Following the conclusion of surgery, those in the infusion group were given an intravenous infusion of tramadol at a rate of 10mg/hr for 24 hours, while those in the bolus group were given a placebo solution (0.9% Normal saline) and only given boluses of Tramadol 25mg as needed (VAS>4) for up to 24 hours. Postoperative pain was measured with a visual analogue scale (VAS) 24 hours after surgery (as per operational definition). Analgesia was given continuously for 24 hours if the pain score was higher than 4. The sum of analgesics used was also recorded (as per operational definition).

SPSS version 21 analysed the data. Mean and standard deviation were calculated for age, postoperative pain, and total analgesia consumption. Gender and surgical procedure were provided as percentages. Both groups' results were compared using a t-test. P value less than 0.05 was takes as significant. Data were stratified with age, gender, and surgical technique. Stratified groups were also compared using t-test, with P<0.05 considered as a significant.

RESULTS

The mean ages of the patients in Groups A and B were 41.88±8.04 and 42.90±7.52 respectively. In Group A, 35 patients (70%) were female and 15 patients (30%) were male. In contrast, 12 (24%) of the patients in Group B were men, and 38 (76%) were women. Patients in Groups A and B had an ASA status of I in 19 (38%) and 16 (32%) while those in Groups A and B had 34 (68%) and a status of II. 24 (48%) patients underwent total abdominal hysterectomy in Group A, while 4 (8%) patients underwent lower abdominal incisional hernioplasty, 9 (18%) patients underwent appendectomy, 11 (22%) patients underwent inguinal hernioplasty, and 26 (52%) patients underwent total abdominal hysterectomy in Group B as shown in table 1. At the six-hour mark, the mean pain scores in Groups A and B were 5.30 and 1.18 respectively. When it came to Groups A and B, the numbers were 5.60 for Group A and 5.08 for Group B at the 12th hour, 4.90 for Group A and 5.26 for Group B at the 18th hour, and 4.28 for Group A and 5.02 for Group B at the 24th hour (Table 2). At the sixth hour, the mean analgesia in group A was 60.00±0.00, while it was 61.64±14.68 in group B (P>0.05). At the 12-hour mark, group A's mean analgesia was 117.50±11.88 and group B's was 104.80±21.88 (P 0.05). There was no statistically significant difference in analgesia use between the two treatment groups at the 18th and 24th hours. Specifically, p-values (18th hour) of 0.120 and (24th hour) of 0.929 as shown in Table 3.

Table 1: Baseline Characteristics of the enrolled patients

Variables	Characterstics	Group-A	Group-B
Age	Mean±SD	41.88±8.04	42.90±7.52
Gender	Male	15(30%)	12(24%)
	Female	35(70%)	38(76%)
ASA	I	19 (38%)	16 (32%)
	II	31 (62%)	34 (68%)
Surgical procedures	Lower Abdominal incisional Hernioplasty	6 (12%)	4(8%)
	Appendectomy	10 (20%)	9 (18%)
	Inguinal Hernioplasty	10 (20%)	11 (22%)
	Total Abdominal Hysterectomy	24 (48%)	26 (52%)

Table 2: The level of pain in groups at various follow-up times

Variable	Hours	Group-A	Group-B	p-value
Mean Pain Score	6 h	5.42±0.61	5.30±1.18	0.525
	12 h	5.60±0.99	5.08±1.60	0.054
	18 h	4.90±1.37	5.26±1.16	0.160
	24 h	4.28±1.68	5.02±1.12	0.011

t-test, indicating that the difference that was noticed was statistically significant

Table 3: Analgesic use in treatment groups at various follow-up times

Variable	Hour	Group-A	Group-B	p-value
Mean Analgesic consumption	6 h	60.00±0.00	61.64±14.68	0.431
	12 h	117.50±11.88	104.80±21.88	0.000
	18 h	165.20±28.52	155.50±33.23	0.120
	24 h	203.20±37.98	203.90±40.35	0.929

t-test, indicating that the difference that was noticed was statistically significant

DISCUSSION

Patient anxiety, tension, and unhappiness can result from poorly managed post-operative pain, which remains a significant problem. Poor pain management can have far-reaching consequences, not only physically damaging, but also emotionally, financially, and socially.[10]

Genuine efforts, it is thought, might lead to considerable improvements in pain care in both developed and underdeveloped countries.[11] These efforts are crucial because reducing pain is one of the most effective ways to alter the body's stress response to surgery, which in turn improves patient outcomes.[12]

The study's findings indicate that from the sixth to the twenty-fourth hour postoperatively, neither treatment group's pain score nor analgesic use showed any statistically significant differences. For example, p-value (6th hour) = 0.052 [Group-A (Tramadol infusion): 0.78±0.8 vs. Group-B (Tramadol Bolus): 1.10±0.78], p-value (12th hour) = 0.263 [Group-A: 2.10±0.93 vs. Group-B:2.32±1.01], & p-value (24th hour) = 0.288 [Group-A: 4.54 When stratified by patient age, gender, and surgery type, neither treatment group showed any statistically significant differences in pain level or analgesic usage.

In a similar study conducted by Wang et al. in China found that after 24 hours of surgery, the mean pain score was significantly higher with bolus tramadol (424.75) than with tramadol infusion (334.75) This finding led the researchers to conclude that administering a single dose of intravenous tramadol 30 minutes before abdominal surgeries improves analgesia and reduces the need for morphine patient-controlled analgesia. In the infusion group, morphine intake was 48.6 (32.2-63.9)mg after 24 hours, while in the bolus group, it was 22.5 (14.3-35.3)mg (p=0.017).[5]

Local research by Waqar Hassan, however, found that after 24 hours post-op, the mean pain score was the same in both the tramadol bolus and tramadol infusion groups (p-value>0.999). The median total tramadol dose in the infusion group was 438±50mg after 24 hours, while the median total in the bolus group was 250±50mg (p0.0001). However, it was also discovered that analgesic consumption was lower in the infusion group, leading to the conclusion that continuous infusion is superior to bolus in terms of simple administration and improved pain control during postoperative care.[6]

In this study, tramadol as infusion and as bolus showed no statistically significant difference in pain scores at 6th, 12th, and 24th hour as well as analgesic consumption at the same time intervals. At 24 hours, mean pain score and mean analgesic consumption were higher in tramadol-infused patients, but p-values did not demonstrate a meaningful difference. Although these results match Waqar Hassan's, they contradict Wang F.

In this study, multiple surgical methods were included, which may explain why a therapy regime didn't work. However, the previous studies only covered one type of surgery patients. However when pain level and analgesic use was stratified by type of operation no statistically significant difference was detected for both treatment groups.

How much on-demand bolus analgesia is needed to manage postoperative pain is also affected by the type of surgery that was performed. Prior reports have mixed patients who have had gynaecological surgery with those who have had major orthopaedic surgery only once.[13] O-desmethyle tramadol is the predominant active metabolite of tramadol, and its concentration at any one time may be changed by the manner in which tramadol is taken. It is claimed to have a stronger affinity for opioid receptors than the parent molecule.[14]

Studies on oral tramadol are limited in abdominal surgeries patients. Patients recovering from inguinal hernia repair, hemorrhoidectomy, and varicose veins surgery were randomly assigned to receive either tramadol/paracetamol or codeine/paracetamol in an Italian study. At 1, 6, 12, 24, and 48 hours after surgery, the average pain scores were considerably lower in the tramadol group.

In contrast to our findings, in which reversion of analgesia and rescue analgesia were considerably higher in the tramadol group compared to the intravenous nalbuphine group, the rescue analgesia required was 18.2% in the codeine group and 5.5% in the tramadol group.[15]

One of the limitations of our research was that effect of movement on pain relief was not assessed. Our study's other weakness was its small sample size. It's possible that a single dose of the study medication won't tell us much about the drug's safety or effectiveness. More extensive research is needed to verify our findings.

CONCLUSION

In patients having lower abdominal operations, both tramadol administration methods are equally beneficial in reducing pain and analgesic use.

REFERENCES

1. Small C, Laycock H. Acute postoperative pain management. Journal of British Surgery. 2020 Jan;107(2):e70-80.
2. Van Boekel RL, Warlé MC, Nielen RG, Vissers KC, van der Sande R, Bronkhorst EM, Lerou JG, Steegers MA. Relationship between postoperative pain and overall 30-day complications in a broad surgical population: an observational study. Annals of surgery. 2019 May 1;269(5):856-65.
3. Vasilopoulos T, Wardhan R, Rashidi P, Fillingim RB, Wallace MR, Crispen PL, Parvataneni HK, Prieto HA, Machuca TN, Hughes SJ, Murad GJ. Patient and procedural determinants of postoperative pain trajectories. Anesthesiology. 2021 Mar 1;134(3):421-34.
4. Cabedo N, Valero R, Alcón A, Gomar C. Prevalence and characterization of postoperative pain in the Postanaesthesia Care Unit. Revista Española de Anestesiología y Reanimación (English Edition). 2017 Aug 1;64(7):375-83.
5. Motamed C. Clinical Update on Patient-Controlled Analgesia for Acute Postoperative Pain. Pharmacy. 2022 Jan 27;10(1):22.
6. Baldo BA, Rose MA. The anaesthetist, opioid analgesic drugs, and serotonin toxicity: a mechanistic and clinical review. British journal of anaesthesia. 2020 Jan 1;124(1):44-62.
7. Subedi M, Bajaj S, Kumar MS, Mayur YC. An overview of tramadol and its usage in pain management and future perspective. Biomedicine & Pharmacotherapy. 2019 Mar 1;111:443-51.
8. Wang F, Shen X, Xu S, Liu Y. Preoperative tramadol combined with postoperative small-dose tramadol infusion after total abdominal hysterectomy: a double-blind, randomized, controlled trial. Pharmacological Reports. 2009 Nov;61(6):1198-205.
9. Hassan W, Inam M, Satar A, Arif M. Postoperative analgesia with tramadol in orthopedic surgery: continuous infusion versus repetitive bolus administration. J Surg Pak. 2012 Oct;17:4.
10. White PF, Kehlet H. Improving Postoperative Pain ManagementWhat Are the Unresolved Issues? J Am Soc Anesthesiol 2010;112(1):220-5.
11. Brennan F, Carr DB, Cousins M. Pain management: a fundamental human right. Anesth Analg 2007;105(1):205-21.
12. Kehlet H, Wilkinson RC, Fischer HBJ, Camu F, Group PW. PROSPECT: evidence-based, procedure-specific postoperative pain management. Best Pract Res Clin Anaesthesiol 2007;21(1):149-59.
13. Bean-Lijewski J. Glossopharyngeal nerve block for pain relief after pediatric tonsillectomy: retrospective analysis and two cases of life-threatening upper airway obstruction from an interrupted trial. Anesth Analg 1997;84(6):1232-8.
14. Whipple JK, Quebbeman EJ, Lewis KS, Gottlieb MS, Ausman RK. Difficulties in Diagnosing Narcotic Overdoses in Hospitalized Paitents. Ann Pharmacoth 1994;28(4):446-50.
15. Alfano G, Grieco M, Forino A, Meglio G, Pace MC, Iannotti M. Analgesia with paracetamol/tramadol vs. paracetamol/codeine in one day-surgery: a randomized open study. Eur Rev Med Pharmacol Sci 2011;15(2):205-210.