

Comparison of the Effect of Injectable Acetaminophen with Injectable Ketamine by Morphine Pump on Reducing Acute Pain after Laparoscopic Cholecystectomy Surgery

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Submitted: 2023, Oct 17; Accepted: 2023, Nov 06; Published: 2023, Nov 13

Citation: Karbord, A., Pourfarokh, M., Golrezaei, M., Aca, M. A. (2023). Comparison of the Effect of Injectable Acetaminophen with Injectable Ketamine by Morphine Pump on Reducing Acute Pain after Laparoscopic Cholecystectomy Surgery. *J Pharmaceut Res*, 8(2), 335-339.

Abstract

Introduction: At the issues that have always been the concern of the surgical team is finding a way to better control post-operative pain, because pain controls a significant role in the length of time the patients stay in the hospital, the level of patient satisfaction, the recovery period and the patient's return to normal life activities. Millions of patients in the world undergo surgery every year, and most of them report unrelieved pain after the surgery.

Aim: To compare the control and reduction of acute pain in patients after laparoscopic gallbladder surgery by injectable acetaminophen and injectable ketamine.

Materials and methods: this RCT study, which was conducted as a non-blind randomized clinical trial, 50 laparoscopic gallbladder surgery patients who referred to the teaching hospitals of Qazvin University of Medical Sciences in 2022 were selected as available and as Injectable acetaminophen and injectable ketamine were randomly divided into two drug groups and pain reduction was investigated and analyzed.

Results: this study, the average age group of patients (in two groups) was 49.34 ± 13.52 , and the pain reduction in both groups was less in those under 30 years of age, and more pain reduction in those over 30 years old, so that over 50 years of age had the greatest pain reduction, and The reduction of pain in the acetaminophen group was more than that of ketamine and it was statistically significant ($P = 0.02$). The reduction in pain intensity in the patients in the injectable acetaminophen drug group after receiving the full dose of the drug showed a noticeable and greater decrease compared to the ketamine group. Therefore, injectable acetaminophen was seen as an effective drug in reducing pain after laparoscopic surgery and it was statistically significant. ($P = 0.002$).

Conclusion: In this study, the effect of injectable acetaminophen was very effective in reducing the amount of pain and the intensity of pain after laparoscopic surgery, but ketamine not only does not reduce the effect of pain, but it also changes the effect of other.

Keywords: Injectable Acetaminophen, Injectable Ketamine, Laparoscopic Surgery and Gallbladder.

1. Introduction

Among the issues that have always been the concern of the surgical team is finding a way to better control post-operative pain, because pain plays a significant role in the length of time the patients stay in the hospital, the level of patient satisfaction, the recovery period, and the patient's return to normal life activity [01]. Millions of patients in the world undergo surgery every year, and most of them report unrelieved pain after the surgery [02]. Also, with the knowledge and development of pain epidemiology and pathology, more attention has been paid to the treatment of postoperative pain as an effort to improve patient comfort, reduce disabilities caused by surgery, and reduce costs by shortening hospitalization time after surgery. Postoperative pain is one of the most important problems in surgical departments. For this reason, improving the methods of pain control after surgery has become very important for anesthesiologists. Today, anesthesiologists have taken a very effective step in this field by inventing patient control analgesia methods [03]. In order to relieve pain in these patients, various methods are used, such as the use of narcotic and non-narcotic painkillers in a systemic way, or the administration of intrathecal and epidural narcotics [04, 05]. Uncontrolled pain after surgery can lead to complications or even death by activating the sympathetic system. Activation of the sympathetic system by increasing myocardial oxygen consumption can lead to ischemia and heart infarction [06]. Also, the activity of the sympathetic system may slow down the return of gastrointestinal movements and lead to paralytic ileus. However, the control of postoperative pain is very important because in patients who do not control the pain well, breathing will be less deep, coughing will not be performed well, and the patient will be exposed to pulmonary complications [07]. The usual method of post-operative pain relief is the use of narcotics, which are injected with the lowest dose due to the increased incidence of nausea and vomiting and the possibility of respiratory complications [08].

The most commonly used narcotic is morphine, which is injected intravenously at the rate of half a milligram per kilogram. Today, intravenous acetaminophen under the brand name Apotel is one of the most common drugs in operating rooms and inpatient departments to control the pain of patients. This drug belongs to the category of painkiller, antipyretic, and its pharmaceutical form is an injection ampoule containing 1 gram of paracetamol in 6.7 ml, and its mechanism of action is to prevent prostaglandin secretion in the CNS, reduce environmental anti-inflammatory effects, and reduce fever with a direct effect. It is on the temperature control center in the hypothalamus. Its uses include temporary relief of mild to moderate pain, especially after surgery, rapid treatment of fever and emergency relief of hyperthermia [09,10]. Ketamine is an aesthetic drug that is used for anaesthesia, sedation and analgesia, and with the antagonistic effect of NMDA (N-methyl-D aspartate) receptor, it prevents or reverses the sensitivity of the central nervous system to painful stimuli and reduces pain after surgery [11]. The amount of pain is different in different surgeries, so that, for example, patients who undergo laparoscopic cystectomy experience less pain

compared to open surgery [12]. In this article, the comparison of the acute pain control of patients after surgery by injectable acetaminophen with injectable ketamine in the medical centers of Qazvin University of Medical Sciences under a double-blind clinical trial study in the form of anaesthesiology residency thesis, specializing in anaesthesia under the supervision of specialists in qualified patients with the permission of the ethics committee University and with the informed consent of the patients, it was examined.

2. Materials and Methods

This study is a double-blind randomized clinical trial that was conducted in patients referred to educational-therapeutic centers of Qazvin University of Medical Sciences in 2022 who are candidates for various surgeries according to the order of the surgeon. Patients who met the necessary conditions, after full training by an anaesthesiologist and filling in the patient's informed personal consent form, entered the study and were randomly assigned to one of the two test groups A (acetaminophen drug) and test group B (ketamine drug) by morphine pump infusion. After entering the operating room, the patients were operated under general anaesthesia, 10 ml/kg of crystalloid serum (Ringer) was administered to all patients upon entering the operating room. To induce general anaesthesia, 2 mg of midazolam, 2 micrograms/kg of fentanyl, 5 mg/kg of nesdonal, and 5.0 mg/kg of etracurium were administered intravenously, and tracheal intubation was performed. After recording the basic vital signs, the patients were randomly assigned to three groups were divided. Then after the surgery is completed and the patient regains consciousness, he enters the recovery department. Test group A and B, after fully regaining consciousness and expressing pain, injected acetaminophen and ketamine by microset After 3, 6, and 12 hours (patients before surgery) pain intensity and pain measurement criteria were checked. Using a ruler-like grading system (Visual Analog Scale) from 0 (no pain) to 10 (the most severe pain imaginable) was recorded after the operation by a trained doctor or nurse, and the control group was prescribed painkillers by the routine method of the hospital and painkillers, and the intensity and level of pain were recorded. infusion by an anaesthesiologist as pain reliever with a dose of 1 ml g/kg of injectable acetaminophen/half mg/kg of injectable ketamine plus 01/. A milligram of morphine in 100 cc of normal saline was injected intravenously to the patient at a rate of 4 drops per minute to reduce pain. Before the surgery, the patients were instructed to rate their pain after the operation using a ruler-like grading system (Visual Analog Scale) from 0 (no pain) to 10 (the most severe pain imaginable). The pain level of the patient was recorded at 3, 6 and 12 hours after the operation by a trained doctor or nurse. During this period, if the patient felt the need for pain relief ($VAS \geq 4$), ketamine/acetaminophen 0.5 mg/kg was injected for the test groups and morphine 0.02 mg/kg for the control group and it was recorded in the file. The minimum interval between injections was 4 hours the amount of postoperative pain and the total amount of painkillers consumed in the recipient groups were compared with the control group.

3. Discussion and Conclusion

In this study, the gender factor was first investigated, and it was shown that the reduction of pain was not significantly related to gender ($p = 0.033$), although the amount of pain reduction was higher in men than in women and in the acetaminophen group. It was seen more than ketamine, but no significant relationship was seen ($P = 0.076$). Perhaps the lack of significance in this study is due to the small sample size or other uncontrolled factors caused the lack of significance. Also, this case is consistent with Mr. Mohammadi's study in 2016 [13-21]. Age groups in the two drug groups of injectable acetaminophen and injectable ketamine showed that the reduction of pain in laparoscopic cholecystectomy surgery with any dose of acetaminophen or ketamine is much less in the age group of less than 30 years compared to other age groups, and in cases over 50 years of age, the reduction rate Pain was seen especially in the injectable acetaminophen group compared to injectable ketamine, which shows the effectiveness of acetaminophen in reducing pain in high age groups. The average age group in both groups was 49.34 ± 13.52 , but the effect of drug treatment in both cases and comparing.

with age, statistically, a significant relationship was seen ($P = 0.02$). Also, the reduction of pain in the acetaminophen group was more effective than in the ketamine group and was statistically significant ($P = 0.02$) and showed that acetaminophen is more suitable than ketamine for reducing pain, especially in the elderly, in laparoscopic cholecystectomy surgery. These results are consistent with the results of the study conducted by Popek Rahim Zadeh and her colleagues at Iran University of Medical Sciences, Hospital [22]. In addition, the body mass of people in different groups of people in the two drug groups of injectable acetaminophen and injectable ketamine showed that the reduction of pain with the average body mass. 81.19 ± 29.27 is related and the amount of pain reduction was significantly related to BMI ($P = 0.01$), and the pain reduction in acetaminophen group was more than that of ketamine and it was statistically significant ($P = 0.03$). This effect has also been seen in other studies [23-28]. The effect of receiving morphine with a pump was shown in two drug groups, injectable acetaminophen and injectable ketamine, that the reduction of pain was directly and significantly related to the morphine pump and without it. Also, the amount of pain reduction in the acetaminophen group with morphine pump was higher than that of ketamine with morphine pump. It was seen and showed that the reduction of pain with injectable acetaminophen and morphine is more than with injectable ketamine and morphine, which was directly related to other studies [29-31]. According to the time table of the duration of surgery of people in groups with different durations of people in the two drug groups of injectable acetaminophen and injectable ketamine, it was shown that the reduction of pain has an inverse relationship with the time of the surgical procedure, and this relationship is

significant ($P = 0.001$). , that is, the shorter the surgery time, the lower the pain level, and this reduction was observed more in the acetaminophen group than in the ketamine group, and the longer the surgery time, the lower the effectiveness of the drugs in reducing pain after surgery. According to the table, in general, the pain reduction rate In people in the injectable acetaminophen drug group, after receiving the full drug dose, a noticeable and greater decrease was seen compared to the ketamine group, and this relationship was significant ($P = 0.02$). Although the administration of ketamine also reduced pain in 50% of cases, but the medicinal effect of acetaminophen in reducing pain after surgery is much more effective than ketamine. According to the Table 1, the reduction of pain in the injectable acetaminophen drug group immediately after surgery, 56% said that their pain decreased, but in the ketamine group, less than 28% said that their pain decreased, but after three hours, the amount of pain reduction in the group Acetaminophen increased from 56% to 80%, but there was no significant change in the ketamine group. After 6 hours, the amount of pain reduction in the acetaminophen group was very significant (90%) and in the ketamine group, it was also higher, but it decreased slightly after 12 hours. But there was little change in the ketamine group as before, so injectable acetaminophen as an effective drug in reducing pain after laparoscopic surgery can be effective and statistically significant. ($P = 0.002$). So, in choosing between acetaminophen and victim to reduce pain after surgery, acetaminophen can be an effective choice. According to the Table 2, the reduction in pain intensity in the acetaminophen group was the highest reduction in pain intensity after (3, 6, and 12 hours), after 6 hours after injection, 12 hours after that, and then 3 hours, which shows that after 8 hours of injection, the highest amount A reduction in pain intensity can be seen, but in the ketamine group, there were no significant changes in the amount of pain reduction in the hours after the injection. Between acetaminophen and ketamine, the effect of acetaminophen on the reduction of pain intensity was greater and it was statistically significant ($P = 0.001$).

The use of acetaminophen infusion in the form of infusion or intravenous state to reduce acute pain after laparoscopic surgeries is a very useful option that can reduce the intensity and level of pain for up to ten hours very well and tolerable pain for up to 12 hours, but the injection of ketamine drug is not The only thing is that it does not have a significant effect in reducing pain and its intensity, it can even distort the effect of other drugs, especially increase the amount of hallucinations to a great extent, because of this simultaneous use of ketamine and other sedatives or painkillers, it is not possible to check that other drugs reduce pain. reduce or not.

In this study, the remarkable effect of injectable acetaminophen up to 12 hours after laparoscopic surgery was seen in reducing pain and its severity, and it was statistically significant.

| P- value | injectable ketamine=25 | | Injectable acetaminophen=25 | | Pharmaceutical group |
|----------|------------------------|----------------|-----------------------------|----------------|-----------------------|
| 0.004 | Pain | Pain reduction | Pain | Pain reduction | morphine pump |
| | 20 | 1 | 15 | 1 | With morphine pump |
| | 1 | 3 | 5 | 4 | Without morphine pump |
| | 21 | 4 | 20 | 5 | total |
| 0.001 | | | | | P- value |

Independent Samples t- Test

Table 1: Reduction of pain based on the absence of morphine pump in the groups of people participating in the study

| P- value | injectable ketamine=25 | | Injectable acetaminophen=25 | | Pharmaceutical group |
|----------|------------------------|----------------|-----------------------------|----------------|----------------------|
| 0.004 | Pain | Pain reduction | Pain | Pain reduction | morphine pump |
| | 8 | 3 | 6 | 4 | Less than an hour |
| | 7 | 2 | 7 | 3 | 1-2hour |
| | 2 | 2 | 1 | 2 | 2-3hour |
| | 1 | 0 | 1 | 1 | More than 3 |
| | 18 | 7 | 15 | 10 | total |
| 0.001 | | | | | P- value |

Independent Samples t- Test

Table 2: Reduction of pain based on the duration of surgery in the groups of people participating in the study

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