



Effect of Morphine versus Ketamine Injection for Pain Management in Patients with Long Bone Fractures based on Different Site of Fractures

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ABSTRACT

In this study we evaluate the effect of morphine versus a low dose of ketamine injection for pain management in patients with long bone fractures based on different site of fractures. This is a double-blind clinical trial, The patients enrolled in the study are 18 to 65 years old with the upper or lower extremity long bone fractures and direct blunt trauma to the emergency department of the hospital, IRCT2017041221480N6. The patients were divided into two groups K and M. At zero minutes patients receive in group K 0.5mg/kg Ketamine and 0.1mg/kg morphine slow intravenous for morphine group. The affected limb immobilized with a splint or sling and X-rays to be asked. After observing the fracture to the affected limb skin traction splint or plaster is done. Pain score at minute 30, 60, 90, 120, 180, 240 is measured and recorded. Pain score, blood pressure, pulse rate, respiratory complications related to medications registration and treatment. Individuals randomly divided into two groups of 78 patients, morphine and ketamine group. Pain in the origin of time. In femoral fractures and the proximal humerus was highest level of pain, Ulnar and radial shaft fracture at the lowest levels were in the trunk. Ketamine as the safe, efficacious and appropriate drug can be used as an alternative to morphine for treating pain associated with long bone fractures in the emergency department.

Key words: Morphine, Ketamine, Pain, Emergency, Fracture

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INTRODUCTION

More than 70 percent of visits to the emergency department originated from pain. In the meantime, there are numerous ways to treat pain. The best solutions are those that are sufficient to eliminate pain, without significant side effects [1].

The World Health Organization has introduced a guideline for the treatment of severe pain, including treatment methods, medical and a

variety of procedures, which one of them is opioid [2]. Morphine has been recognized as the main treatment of pain and according to the available and effective. However, it has many side effects. If too much is used, in cases of acute respiratory depression, hypotension and inability to express symptoms of chronic deterioration of the situation and its causes are physiological and psychological dependence [3]. Some doctors because morphine has an initial success in the treatment of pain have a great desire to use it, whereas nowadays a large variety of treatments exist that various studies preferred giving them [2-4] Ketamine is a drug that is used to relieve pain. Several studies have shown that ketamine is effective in the treatment

of pain and the most common opioid analgesic that is used in emergency centers [5-8].

Fractures comprise 10 to 25 percent of all injuries. Most patients with acute fractures in the emergency department experiencing moderate to severe pain. Different medications are used to treat pain [7-10]. In this study, we attempted to compare the efficacy of morphine and ketamine intravenous pain medication to reduce the pain of long bone fractures based on type of fractures in patients referred to Imam Khomeini Hospital Emergency Department.

MATERIALS AND METHODS

Type of study

This randomized, controlled, double-blinded, clinical trial was conducted in the adult emergency department (ED) of Emam Khomeini hospital, a tertiary general hospital affiliated with Mazandaran University of Medical Sciences, in Northern Iran, during a 6-month period. This study conducted in period of September 2016 to February 2016 with the aim of the evaluation of morphine injection with ketamine injection with a low dose in patients with pain due to bone fractures referring to the emergency hospital Sari in a period of six months. IRCT2017041221480N6 The study protocol was approved by the institutional review board (IRB) and the medical ethics committee of the Mazandaran University of Medical Sciences and all the patients provided their informed written consents before inclusion in the study (IR.MAZUMS.REC.95-1954). The study protocol was also registered with the Iranian Registry for Clinical Trials, IR.MAZUMS.REC.95-1954.

Inclusion criteria

Patients in this study were 18 to 65 years with the upper or lower extremity long bone fractures caused by blunt trauma and directed to the hospital emergency department for control of pain.

Exclusion criteria

- Patients with a history of mental or neurological disorders, liver, kidney, stroke, asthma and other respiratory diseases, heart diseases
- Weight below 45 or above 155 kg
- Pregnant or lactating women
- Pressure above 180 or less than 90 mm Hg

- Heart rate less than 50 or more than 150 minutes
- Respiratory rate below 10 or above 30 minutes
- Decreased level of consciousness
- Blow to the head or eyes
- Multiple Trauma
- Sensitivity to analgesics used in research
- Drug addiction
- Intravenous drug use
- Apart from fractures of long bones
- Fractures, dislocations and fractures with severe displacement, along with the need to reduction
- Open fracture
- Compartment syndrome
- Reluctance of patients to participate in the project
- Receiving analgesic before participating in the study

Data collection method

An instrument for assessing the degree of pain with pain Numeric Rating Scale by the researcher (assistant) was measured from zero to 10 is the worst pain I've ever experienced was graded. Patients with pain score 7 and higher (moderate to severe pain) were enrolled in this study. Research assistant examined patients with blunt and direct trauma to the limbs.

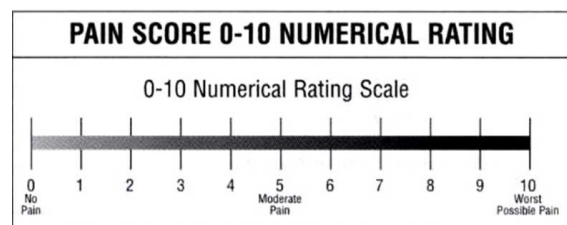


Figure 1: Numeric Rating Scale

The patients were divided into two groups K and M. Way to assign patients to one of two groups based on the random number table. Patients at zero minutes 0.5 mg per kg ketamine and 0.1 mg per kg of morphine received intravenous slow. The affected limb immobilized with sling and orthopedic residents were asked to approve the x rays.

Pain score at minute 30; 60; 90; 120; 240 180, measured and recorded. Achieving pain score 3 or 50% below the initial score was the goal. In the absence of pain relief at any time of the study, half the previous doses of the same group drug were given.

Statistical analysis

To evaluate the results obtained, SPSS software version 18 including t-test and the Chi-square test was used for variables.

RESULTS

This study aimed to evaluate the effect of a low dose of morphine injection with intravenous ketamine in patients with long bone fractures whom had pain. Study performed on 156 patients with 65 -18year-old presenting to the emergency department Hospital for pain control. Individuals randomly divided into two groups of 78 patients, morphine and ketamine group. Many patients because of issues presented in Exclusion criteria were excluded such as fractures with dislocation 1, open fracture 3, 3 people allergic to morphine, 5 people were addicted, 8 fractures require traction by orthopedic, use of analgesics hours ago referring to the center 35 and 7 were not satisfied. 7 patients left the hospital because of personal satisfaction and refusal of treatment were excluded (Replaced by other patients).

Table 1 shows the two groups have distributed the same in type of fracture probability. Chi square test showed that the two groups are homogeneous type of fracture (Table 3).

The results showed that in the two treatment groups pain in the origin of time and thirty minutes after treatment depending on the type of fractures has significant difference. at the origin of time in the two groups of fractures of the femur and proximal humerus it was at the highest level of pain and shaft fracture of the ulnar and the trunk of radius have been at the lowest levels. At 30 minute In both groups of femoral fractures was highest.

In ketamine group the ulnar and radial shaft fracture were at the lowest level and in morphine group distal radius and tibia fracture was located at the lowest level. The pain scores between the two groups by the type of fracture are showed in figure 1 (1,2,3,4,5,6,7,8).

Table 1. Evaluation of fracture patients in the two treatment groups

p-value	DF	Chi-Square	Total		morphine		ketamine		
			percent	frequency	percent	frequency	percent	frequency	
.508	5	4.291	39.7	62	44.3	35	35.1	27	Distal radius
			12.2	19	10.1	8	14.3	11	Femoral
			14.1	22	13.9	11	14.3	11	Proximal humerus
			9.0	14	6.3	5	11.7	9	Trunk radius
			17.3	27	15.2	12	19.5	15	Tibia
			7.7	12	10.1	8	5.2	4	Ulnar shaft
			100.0	156	100.0	79	100.0	77	Total

Table 2- An average pain intensity over time between the two treatment groups by the type of fracture and comparison of groups

P	ulnar		tibia		shaft radius		Proximal humerus		Femor		Distal Radius		time	treatment groups
	STD	mean	STD	mean	STD	mean	STD	mean	STD	mean	STD	mean		
.000	.50	7.75	.52	8.13	.44	7.78	1.10	8.27	.87	9.18	.52	7.96	start	ketamine
.030	.50	3.75	1.41	4.53	.33	3.89	1.86	5.36	2.07	5.55	.97	4.37	30	
.422	.50	2.75	1.06	3.60	.33	3.11	1.29	3.64	1.54	3.82	.80	3.41	60	
.130	.50	1.75	.63	2.40	1.22	3.00	1.22	3.09	1.30	3.09	.92	2.81	90	
.297	.00	1.00	.76	2.00	.83	1.78	1.10	2.27	.89	2.00	.97	1.89	120	
.272	.00	1.00	.83	1.60	.73	1.44	1.00	2.00	.81	1.64	.70	1.44	180	
.314	.00	1.00	.74	1.47	.44	1.22	1.08	1.82	.82	1.55	.62	1.33	240	
.000	.53	7.50	.67	8.08	.55	7.40	.94	9.09	.74	9.37	.51	7.91	start	
.002	1.58	4.75	1.00	4.58	1.92	4.80	1.96	5.64	1.30	6.38	.94	4.34	30	
.134	1.19	3.38	.67	3.42	.55	3.60	1.27	3.73	.64	4.13	.57	3.29	60	
.511	.92	2.38	.67	2.50	1.00	3.00	.90	2.73	.83	3.13	.95	2.60	90	morphine
.747	.92	1.63	.87	1.75	.84	2.20	.89	2.00	1.13	2.13	.95	1.74	120	
.308	.92	1.63	.79	1.42	.84	2.20	.79	1.73	1.04	1.75	.69	1.40	180	
.054	.52	1.38	.78	1.33	.84	2.20	.69	1.45	1.04	1.75	.55	1.23	240	

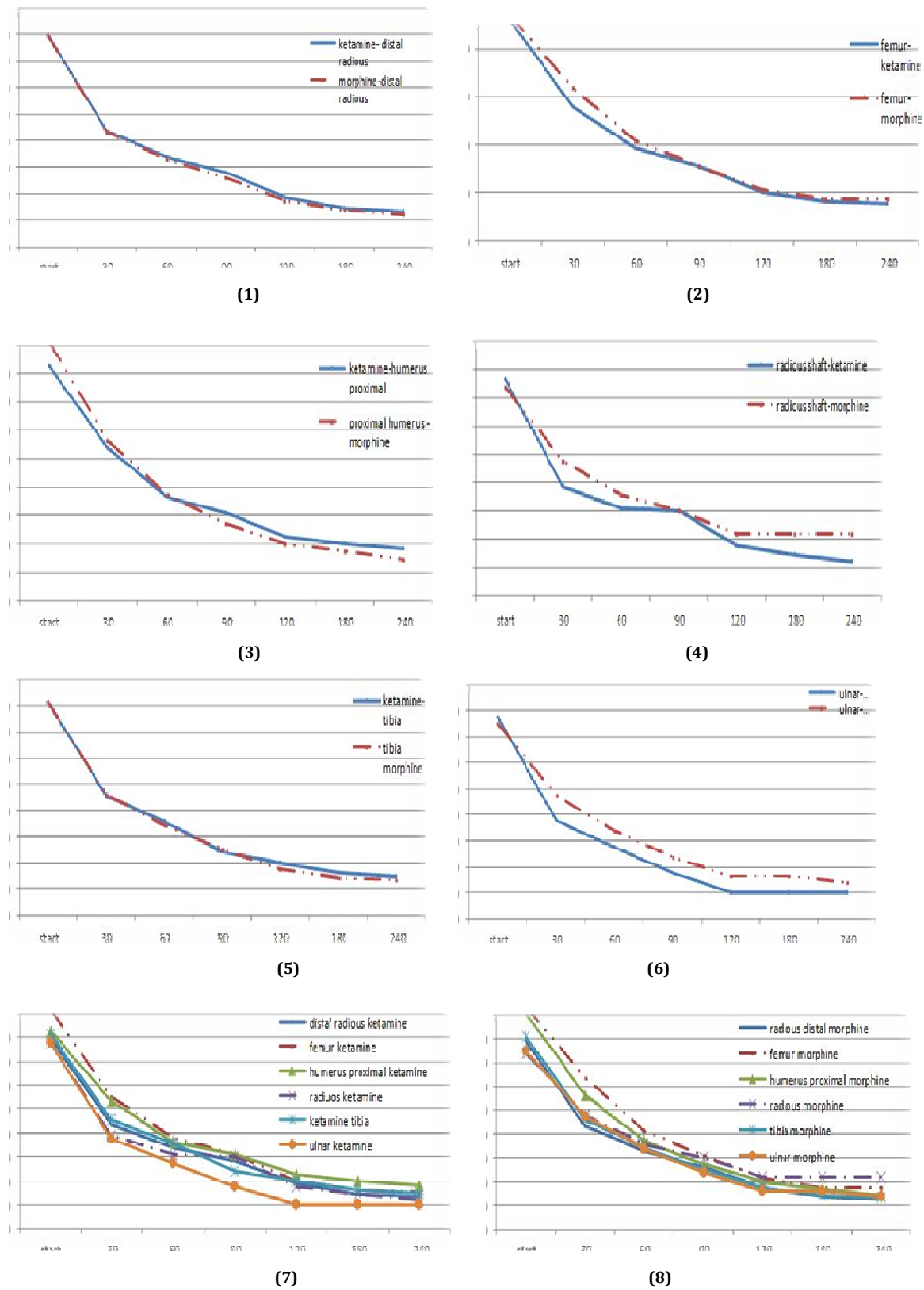


Figure 2. The pain intensity graphs between the groups

DISCUSSION

In this study we examined the effect of morphine versus a low dose of ketamine injection for pain management in patients with long bone fractures based on different sit of fractures.

our results indicated at the origin of time in the two groups of fractures of the femur and proximal humerus it was at the highest level of pain and shaft fracture of the ulnar and the trunk of radius have been at the lowest levels. At 30 minute in both groups of femoral fractures was highest. In ketamine group the ulnar and radial shaft fracture were at the lowest level and in morphine group distal radius and tibia fracture was located at the lowest level. Up to know no study examined the effect of painkillers based on fractures type.

In a study by Kollender Y *et al.*, examined Fifty-seven patients. They studied a 10-month prospective, randomized, double blind research to compare the effects of a morphine dose to a 35%-lower dose plus a subanaesthetic dose of ketamine (MK) for pain management. They revealed that Pain scores were lower in the MK group compared to the morphine patients. But they did not evaluate the site of injury on final outcomes [11].

In a systematic review and meta-analysis of randomized trials which examined 2,502 patients indicated that Adding ketamine to morphine/hydromorphone patient-controlled analgesia provides a small improvement in postoperative analgesia while decreasing opioid requirements [12]. But this study did not evaluate the drugs one by one. In this regards, some other studies showed that that adding low-dose ketamine to morphine patient-controlled analgesia is safe and post-thoracotomy may provide better pain control than patient-controlled analgesia with morphine alone (PCA-MO), with decreased morphine consumption and possible improvement in respiratory function [13].

CONCLUSION

Ketamine as the safe, efficacious and appropriate drug can be use Alternative to morphine for treating pain associated with long bone fractures in the emergency department.

Limitation

The limitation of our study is that we could not use higher doses of ketamine due to potential psychomimetic effects. One of the other limitations in our study is the short duration of preoperative assessment which could not evaluate the effect of drug. Another limitation is the small sample size therefore; we recommend larger sample size in future results.

Disclosure

The authors report no conflicts of interest in this work.

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