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ORIGINAL ARTICLE

Comparison of the Effect of Intravenous Morphine and Acetaminophen in Pain Control of Patients Admitted to Intensive Care Unit

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ABSTRACT
Pain is one of the most common complaints of patients admitted to intensive care units. Various analgesic medications and multimodal approaches have been used in pain management.In this study, we tried to compare the efficacy of intravenous morphine and acetaminophen for pain control in patients admitted to intensive care unit of Urmia Emam hospital. Sixty patients aged between 20 and 70 years who were scheduled to have major abdominal surgery enrolled in this prospective clinical trial in two equal groups of 30 each. Demographic data, systolic and diastolic blood pressure, heart rate and pain scores [visual analogue score (VAS) and behavioural pain scale (BPS)] along with drug cost in both groups were recorded and assessed. Spss software version 18 was used to analyze the data collected and the required statistical tests were used in data analysis. Our study showed that systolic and diastolic arterial blood pressure, heart rate and VAS pain score between the two groups were almost similar.Mann-Whitney test indicated that difference between scores ofbehavioralpain scale in both groups was statistically significant. (P value =0/0001).Intravenous acetaminophen is more effective than morphine in relieving pain in intubated patients. Intravenous Acetaminophen is more expensive than morphine, the difference was statistically significant.(P value = 0/01). Our study showed that both drugs (morphine and IV acetaminophen) are equally effective for postoperative pain control in patients hospitalized in intensive care units, but IV acetaminophen is more expensive than morphine. Further studies are recommended.
***Keywords**: Pain, Morphine, Intravenous Acetaminophen, Intensive care unit.*

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INTRODUCTION

Contrary to popular belief our main task is not saving life of patients because this is impossible, but it is our duty to relieve their suffering. there is no place in the hospital where patient's pain and suffering can be compared with that of intensive care unit [1].Pain and discomfort in the intensive care unit may occur for various reasons. Pain may have several reasons such as serious illness, surgical wounds, trauma, tubes and catheters. Continuous stimulation of personnel and equipment disturb the circadian rhythm and cause pain, anxiety and delirium [2]. Most patients who are receiving mechanical ventilation have pain that could be revealed by the endotracheal tube and suctioning [3].

Also pain is one of the most common and unpleasant side effects of operations. Pain exacerbates during surgery because of tissue damage and the release of histamine and inflammatory mediators. Pain increases sympathetic tone, production of catabolic hormones such a cortisol and catecholamines, antidiuretic hormone (ADH), glucagon, ACTH, renin, angiotensinII and reduces anabolic hormones. The stress response can cause hypercoagulable conditions. Stress response can lead to immune suppression and hyperglycemia. This could delay wound healing and immunity function improvement [4] .

Systemic treatments are non-steroidal anti-inflammatory drugs (NSAIDs) and acetaminophen; but the narcotic pain-reliever with anti-anxiety, antitussive and tranqulizer specfity are the most common pain treatments in the intensive care unit. Morphine, hydromophone and fentanyl are the most commonly used opiates in the ICU. Remifentanil is beneficial despite its short-acting sedative and analgesic effects [5]. Non-steroidal anti-inflammatory drugs(NSAIDs)have many side effects [6]. Acetaminophen (non-narcotic analgesic and NSAID) have been using without any side effect in various studies in European countries from1985to 1999 [7].

A study was conducted on 38 patients showed a significant reduction in systemic blood pressure. Authors concluded that its prevalence should not be neglected [8]. Because of post operation of pain frequency and known side effectsin this study, we tried to compare the efficacy of intravenous morphine and acetaminophen for pain control in patients admitted to intensive care unit of UrmiaEmam hospital.

MATERIALS AND METHODS

This study was a single blind clinical trial. Approval of the ethical committee was obtained .Sixty Patients aged between 20 – 70 years old and with major abdominal surgery admitted intubated to ICU were included in the study. Patients were evaluated after passing a period of equal to half life of non-depolarizing relaxant drugs for the pain intensity using behavioral pain scale (BPS) (table 1).Fentanyl 1μg/kg every 0.5 to 1 hours was administered to achieve the desired pain score then patients were divided into two equal groups of 30.

Table 1: The Behavioral Pain Scale [9]

Item	Description	Score
Facial expression	Relaxed Partially tightened (e.g, brow lowering) Fully tightened (e.g, eyelid closing) Grimacing	1 2 3 4
Upper Limbs	No Movement Partially bent Fully bent with finger flexion Permanently retracted	1 2 3 4
Compliance with ventilation	Tolerating movement Coughing but tolerating ventilation for most of the time Fighting ventilator Unable control ventilation	1 2 3 4

Modified from paven JF, bru O, BoesonJI , et al. Assessing pain in critically ill sedated patients using a behavioral pain scale.

One group received 1gr intravenous acetaminophen in 30 minutes and every 6 hours thereafter (acetaminophen group). Another group received morphine infusion 0.1mg/kg that repeated every hour (morphine group).Vital signs and pain intensity were evaluated every 4 hours.In case of BPS score of 3or more morphine 0.1mg/kg was administered. Pain intensity was measured by VAS (visual analogue scale) after patient extubation until leaving ICU. Morphine 0.1 mg/kg was administered to keep the pain score less than 3.Vital signs, extubation time and discharge from ICU, total morphine and, acetaminophen consumption and their cost were assessed.

Patients with contraindications for intravenous acetaminophen and morphine use ,younger than 20 and older than 70, drug addiction and those with ARDS were excluded from study.

RESULTS

In morphine group 13 patients were male (43.3%) and 17 female (56.7%). Descriptive statistics for the morphine group can be seen in table 2.

Acetaminophen group had 14 male patients (46.7%) and 16 female (53.3%). Descriptive statistics for the acetaminophen group can be seen in table 3. Gender distributions in the two groups were similar. Comparing the effects of intravenous morphine and acetaminophen groups using T-test showed that there was a not statistically significant difference between systolic arterial pressure, diastolic arterial pressure, and heart rate and VAS scores.(p value >0.05)

Table 2: Descriptive statistics for the morphine group

variable	Min	Max	Mean±SD
Age(Y)	22	70	50.33±15.34
SBP(mmHg)	107	171	132.67±15.19
DBP(mmHg)	64	100	80.17±10.17
HR	73	143	101.27±15.64
BPS	3	11	6.87±2.43
VAS	0	8	3.47±2.27
Extubation time(hour)	4	20	9.6±5.1
Length of stay In ICU(hour)	8	48	31.6±12.13
Drug cost(R)	5520	16560	11762±4007.16

Table 3: Descriptive statistics for the acetaminophen group

Variable	Min	Max	Mean±SD
Age(Y)	21	70	53.00±12.69
SBP(mmHg)	105	167	128.40±15.52
DBP(mmHg)	65	106	78.57±10.79
HR	68	136	94.37±24.16
BPS	0	9	5.17±1.93
VAS	0	8	2.70±2.48
Extubation time (hour)	4	20	8.80±4.50
Length of stay in ICU (hour)	16	48	40.00±10.452
Drug cost(R)	90000	330000	273000±72356.87

The Mann – Whitney showed significant statistical differences between two groups in behavioral pain scale (BPS) .Intravenous acetaminophen was more effective in reducing and controlling pain (p value = 0.0001).Also there was significant differences between the two groups in drug cost (p value = 0.01). The correlation between variables was examined using Pearson correlation coefficients; we found significant correlation coefficients between behavioral pain scale (BPS) and the drug used (p-value<0.004) (correlation coefficient-0.366), medication used and medication cost (p-value<0.000) (correlation coefficient-0.933),, arterial systolic pressure and BPS (p-value <0.007) (correlation coefficient-0.956), medication cost and BPS (p-value<0.007) (correlation coefficient-0.346). There was no linear correlation between the remaining variables.

DISCUSSION

Pain is one of the most common complaints of patients admitted to intensive care units[1]. Various analgesic medications and multimodal approaches have been used in pain management [5].In this study, we tried to compare the efficacy of intravenous morphine and acetaminophen for pain control in patients admitted to intensive care unit of UrmiaEmam hospital.

The results of our study showed that systolic and diastolic arterial pressure, heart rate and visual analogue scale (VAS) in both groups were almost similar. Behavioral pain scale (BPS) in both groups have significant difference. Intravenous acetaminophen was more effective than intravenous morphine in intubated patients. Our study also indicated that there is significant difference between the cost of two medications and acetaminophen is more expensive than morphine.Memis et al [10] reported that intravenous acetaminophen reduced Pain scores, consumption of meperidine, extubation time and post operative nausea and vomiting in the meperidine group .Our study is in agreement with Memis et al [10] and Raymond et al [11].Bektaş et al [12] in 2009 indicated that intravenous acetaminophen is safe and

effective in relieving the pain of the patients with kidney stones in the Emergency Department. The results of their study confirmed those from earlier studies [13-15]. The results we obtained were comparable with those of five studies and use of intravenous acetaminophen reduced of pain and consumption of total opiats. Craig et al [16] in 2012 reported no significant differences in analgesic effect between the two groups receiving intravenous acetaminophen and morphine, but there were many side effects in morphine group.Our study is in agreement with Craig et al [16]but we didn't evaluated complications of two drugs during our study. On the other hand our study is in agreement with Zhang et al [17] in 2011.

At last according the previous studies and our data we conclude that intravenous administration of acetaminophen is as effective as opioid for pain relief in surgical patients admitted to ICU. Further studies with larger sample size are recommended.

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