

Original Research Article

Using intravenous acetaminophen in the reduction of opioids in spinal cord surgeries by patient-controlled analgesia

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ABSTRACT

Background: Proper management of postoperative pain results in improved quality of patient's life, early postoperative recovery, reduced hospitalization period and decreased treatment costs. Regarding significant efficacy and higher pain relief functions, opioids are amongst the best pain relief drugs. However, use of these narcotics as pain killers is somehow controversial. Current study investigated the effects of IV acetaminophen in reduced use of opioids in surgeries of spinal cord by PCA method.

Methods: Current double blinded clinical trial study performed upon 86 patients of 20-70 years of age who candidate for spinal CD implant with ASA class I or II. Patients randomly divided into two groups of IV Acetaminophen therapy (N=43) and placebo group (N=43) and each group were put equally under general anesthesia in which both received pain pump containing Fentanyl during recovery. Patients were examined regarding pain score, amount of opioid use and request for extra narcotics and the related complications including nausea, vomiting, dizziness, allergy, gastrointestinal bleeding and Ileus every 6 hours for 24 hours and the obtained results were recorded.

Results: Regarding VAS, pain was significantly lower during 24 hours of study in IV Acetaminophen group ($p < 0.05$). Mean use of opioid via pain pump was significantly lower in IV Acetaminophen group compared with placebo group ($p = 0.00$). Request for extra doses of narcotics was higher in placebo group while regarding demand for extra pain relief, there was no significant difference between both groups. Regarding other results, no significant difference observed between both study groups.

Conclusions: Results of the study indicated that use of a combination of IV acetaminophen along with opioids would be much more effective than use of narcotics alone in postoperative pain control of CD implant surgery of spinal cord and that leads to lower pain score and decreased use of opioids and its related complications.

Keywords: CD implant of spinal cord, IV acetaminophen, Opioids, Pain pump

INTRODUCTION

Pain is an unpleasant sensory and psychological experience associated with actual tissue damage or a condition that causes such offend in the person's mind.¹ Feeling and getting pain different from person to person and this property can prevent enough understanding of how pain occurs and its control. Pain is one of the main causes of the referral of patients to doctors and it has

different aspects such as intensity, perception, quality, location, duration and type of pain.² Suitable management of pain in patients improves their quality of life, accelerating the onset of the patient after surgery, shortens hospital stay and reduces health care costs.^{3,4} Using pain medications after surgery are the most important way to relieve pain. The velocity and high relief of opioids as one of the best pain medications which act through the function of the natural opioids, can

relieve the pain of patients.⁵ Use of narcotics as a sedation associated with complications such as nausea, seizure, muscle stiffness, slow heart rate, reduced gastrointestinal movements, urinary retention and addiction.⁶⁻⁸ One of the ways to reduce the side effects of opioids is the simultaneous use of non-steroidal anti-inflammatory drugs (NSAIDs) including aspirin, naproxen, ibuprofen, indomethacin, diclofenac, celecoxib and acetaminophen and local anesthetics including lidocaine and procaine along with the opioid. This method reduces the consumption of opiates and known as a multimodal relief method that over the past decades known as an effective way to control postoperative pain.⁷ Acetaminophen is one of the newly sedations that used as analgesic and anti-fever and has less side effects and any interactions with other drugs.⁹ In November 2010, FDA approved the use of intravenous acetaminophen for mild to moderate pain in composition with opioids for moderate to severe pain and fever treatment.¹⁰ One of the surgical that is associated with severe pain during and after surgery is lumbar disc surgery.⁸ The aim of this study was to study the reduction of opiate consumption with intravenous acetaminophen in patients with spinal cord surgeries by PCA.

METHODS

Patient selection

This study was a double blind clinical trial that has been done on 86 patients aged 20-70 years who were candidates for spinal cord surgery with class 1 or 2 ASA who were referred to Fatemi hospital in Ardebil after obtaining consent.

Exclusion criteria

Patients with kidney and liver diseases, gastrointestinal bleeding, uncontrolled hypertension, platelet disorders, Sensitization to NSAIDs, history of drug abuse, alcohol and psychotropic drugs, pregnancy and lactation excluded from the study.

Study design

Patients were randomly divided into two groups of intravenous acetaminophen (group A) and placebo (group P) each with 43 patients and they were equally anesthetized with midazolam, fentanyl, propofol and atracurium and received a fentanyl intravenous pump (PCA). The visual analog scale (VAS) scale was used to measurement pain score which was graded from 0-10. The drug complications such as nausea, vomiting, drowsiness based on Ramsey score and gastrointestinal bleeding was recorded up to 24 hours after surgery.

Statistical analysis

Data were collected by a checklist and analyzed by descriptive and analytical methods in spss version 19. $P < 0.05$ was considered significant.

RESULTS

39.5% of patients in the group receiving acetaminophen (A) and 30.2% of the patients in the placebo group (p) were male and the rest were female and the difference between the two groups was not significant. The average weight of group A was 78.7 ± 11.5 and group P was 78.7 ± 11.7 kg P group respectively and weight difference was not significant between the two groups. The average age of groups A and P was 51.1 ± 12.5 and 48.4 ± 14.3 respectively and there was no difference between the two groups in terms of age. There were 17 people with underlying diseases (blood pressure, diabetes and asthma) which 37.2% of them belonged to group A and 23.3% of them belonged to group P and the difference between the two groups was not statistically significant. 62.8% of patients in group A and 76.7% of patients in group P had ASA class 1 and the rest of them had ASA class 2 and the difference between the two groups was not significant. 18 hours after surgery the incidence of nausea and vomiting was significantly lower in group A than group P (Table 1).

Table 1: Frequency of side-effects in patients by times.

Side-effects	Times	Group			
		A		P	
		n	%	n	%
Ileus	6	-	-	-	-
	12	-	-	1	2.3
	18	-	-	1	2.3
	24	1	2.3	2	4.7
Nausea	6	10	23.3	13	30.2
	12	3	7	5	11.6
	18	6	14	2	4.7
	24	3	7	4	9.3

The amount of pethidine in 12 and 18 hours after surgery in group P was higher than group A and there was no significant difference between the two groups. The average consumption of pethidine was also 29 ± 3.1 mg in the 6 hours after surgery and in the group A was 26.8 ± 3.1 mg and the difference was not significant (Table 2).

Table 2: The mean of VAS in patients by times.

VAS	Groups	Mean \pm SD	P-value
6	A	3.7 ± 0.8	0.006
	P	4.2 ± 0.9	
12	A	3 ± 1	0.046
	P	3.4 ± 0.8	
18	A	2.3 ± 0.8	0.002
	P	2.9 ± 0.7	
24	A	1.8 ± 0.8	0.044
	P	2.2 ± 0.7	

In all times the incidence of ileus in group P was higher than group A but this difference was not significant. There were no cases of gastrointestinal bleeding in the two groups and only in 6 hours after surgery an allergic reaction was seen in group A compare to the group P. At all times, the amount of pain in group P significantly more than group A (Table 3). During 6 hours after the surgery the highest rate of sleepiness in groups A and P respectively 79.1% and 65.1% of the slow and during 12

and 18 hours after surgery the highest rate of sleepiness in both groups was slow respectively with 95.3% and 97.7% and during the 24 hours after the surgery the highest levels of sleepiness were in the type of slow with 97.7% in group A and 95.3% in the P group which was not statistically significant (Table 4). The average rate of bullous opiate consumption in group A was 17.4 ± 7.3 cc and in group P was 28.1 ± 10.4 cc and the difference was statistically significant ($P=0.001$).

Table 3: The rate of pethidine in two groups by times.

Times	Groups	n	%	Mean±SD	P
6 hours	A	19	44.2	26.8±3.1	0.038
	P	15	34.9	29±3.1	
12 hours	A	4	9.3	22.5±6.3	0.021
	P	8	18.6	30±5.3	
18 hours	A	7	16.3	25±3.2	0.012
	P	13	30.2	25.1±4.3	
24 hours	A	-	-	-----	-
	P	6	14	25.8±5.8	

Table 4: The rate of sleepiness after surgery by times.

Times	Type of sleepiness	Group A		Group P	
		n	%	n	%
6	Agitated and restless	-	-	2	4.7
	Slow	34	79.1	28	65.1
	Obey the command	2	4.7	2	4.7
	Quick response to the forehead and sound touch	7	16.3	8	18.6
	Delayed response to touch and sound	-	-	3	7
12	Agitated and restless	-	-	1	2.3
	Slow	41	95.3	41	95.3
	Obey the command	1	2.3	-	-
	Quick response to the forehead and sound touch	-	-	1	2.3
	Delayed response to touch and sound	1	2.3	-	-
18	Agitated and restless	-	-	1	2.3
	Slow	42	97.7	42	97.7
	Obey the command	1	2.3	-	-
	Quick response to the forehead and sound touch	-	-	-	-
	Delayed response to touch and sound	-	-	-	-
24	Agitated and restless	1	2.3	1	2.3
	Slow	42	97.7	41	95.3
	Obey the command	-	-	-	-
	Quick response to the forehead and sound touch	-	-	1	2.3
	Delayed response to touch and sound	-	-	-	-

DISCUSSION

Suitable pain management in patients after surgery will cause to reduction the duration of hospitalization and costs of treatment.³ Pain medications after surgery are the most important way to relieve pain. The findings of this study showed that the pain level at all times in the group

receiving venous acetaminophen (A) was significantly lower than the placebo group (p). Similar to the study in Soltani et al, the recorded VAS for paracetamol group significantly lower than control group.¹¹ In the study of Sinatra et al, pain levels in the groups receiving intravenous acetaminophen and paracetamol along with PCA were much lower than those receiving opioid

alone.¹² But in the study of Talebi et al, pain score in 24 hours after surgery was not significantly different between two groups.⁹ In this study, the average consumption of bullous (cc) by pain pump in the group receiving injectable acetaminophen was significantly lower than the placebo group. Reducing the use of opiates in most studies is very clear and in some cases reported up to 46%. Findings of the study by Talebi et al, consistent with the present study showed that the average of opioid use during the surgery in the intravenous acetaminophen administration group was significantly lower than the placebo group.⁹ In the review study of Jebaraj et al, the definite effect of reducing opiate consumption in patients receiving intravenous paracetamol was confirmed in compare to non-opioid group.¹³ In terms of need for additional drugs, the dose of the placebo group was higher than that of the acetaminophen group but there was no significant difference between two groups that perhaps its reason was the complications of anesthesia and illness during the first hours after surgery and the inability to use a pump of pain. In the study of Soltani et al, this study was consistent with the present study while the dose of injected morphine was lower in the paracetamol group than in the control group but this difference was not statistically significant.¹¹ In a study conducted by Hernández-Palazón et al in 2001, the results showed that prescription of paracetamol has reduced morphine consumption after spinal surgery. In 2005, Remy and et al showed the effect of acetaminophen on the consumption and morphine side effects in major surgery.^{14,15} In this study, nausea and vomiting were less in the group receiving acetaminophen than the placebo group except 18 hours after the surgery. Unlike the current study, Mimes and et al showed in 2010 that venous paracetamol not only reduces drug use and exit time of the recovery but also reduces the complications of using narcotics such as nausea, vomiting and itching.¹⁶ The results of the study by Arichi et al showed that the pain score of patients treated with intravenous acetaminophen and incidence of side effects such as nausea, vomiting and itching were lower than the placebo group.¹⁷ The results of the study by Mousavi et al were consistent with the present study showed that using venous acetaminophen is effective in reducing postoperative pain and opioids use and it can be a good alternative for opiates to relieve postoperative pain.¹⁸

CONCLUSION

The results of this study showed that the use of composition intravenous acetaminophen with opioids is effective in controlling pain after spinal CD surgery and it can reduce the pain score in patients, opioid use and the complications of narcotic use such as nausea and vomiting. Performing similar studies in the field of pain control by acetaminophen in a larger number of patients as well as in other surgical procedures and other age groups is recommended in the future.

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