

The Decrease of Pain Severity among Patients with Isolated Closed Fractures of Extremity and Clavicle in Emergency Department

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Abstract

Introduction: Pain as one of the most common reason why people visit emergency room after fracture and soft tissue injury due to trauma. Thus, it should be assessed and managed well, particularly on its acute presentation. Adequate analgesia and early reduction should be done to decrease the severity of pain and minimize soft tissue complications of the injury for displaced fractures. The aim of this study was to assess whether the combination of reduction, immobilization, and injection of ketorolac are sufficient enough to manage pain in the acute setting of closed fractures in the emergency room.

Methods: This was a prospective cohort study conducted on a consecutive series of patients involving patients in Sardjito hospital from August to September 2012 who had isolated closed fracture. After taking the consent from the subjects, the pain was assessed using VAS and divided into 3 categories, mild pain (0-3), moderate pain (4-6), and severe pain (7-10). Standard protocol of fracture management was applied and non-steroidal anti-inflammatory drug was given to the subjects. VAS score was reevaluated 24 hours after intervention. Data was analyzed using Chi-square test.

Results: There were 61 eligible subjects with isolated closed fracture. Pain severity in upper extremity, lower extremity injury, and clavicle injury for both before and after interventions were given was not significantly differs ($p>0.05$). This study showed that the pain severity had significantly decreased after the interventions were given ($p<0.05$).

Conclusion: The combination of early reduction, immobilization, and ketorolac injection were sufficient enough for acute management of isolated closed fracture cases.

Keywords: Pain Severity; VAS; Fracture

Introduction

Pain is one of the most common symptoms of fracture and soft tissue injury due to trauma [1]. It becomes the most common reason why people visit emergency room after trauma. Thus, it should be assess and manage well, particularly on its acute presentation [2]. The assessment is important to decide the interventions needed to manage acute pain in any cases including orthopedic trauma cases. Good pain assessment and management will give huge advantages to the patients.

In the acute management of fracture where there is a complete or incomplete break in a bone, adequate analgesia is important to be given to manage pain that arises due to hard tissue (bone) and soft tissue injury. Besides for the pain management, it also can be used to facilitate the reduction i.e. to restore length, rotation, and angulation of the fracture fragments. This provisional reduction will also minimize soft tissue complications. Afterwards, the joint above and below the injured part should be immobilized [3].

Visual Analog Scale (VAS) is one of easy method that can be used to measure the severity of pain. It was first introduced in the early 1920s [4], presented as a single line of 100 mm with words of no pain in one end and worst possible pain in other end. There are several

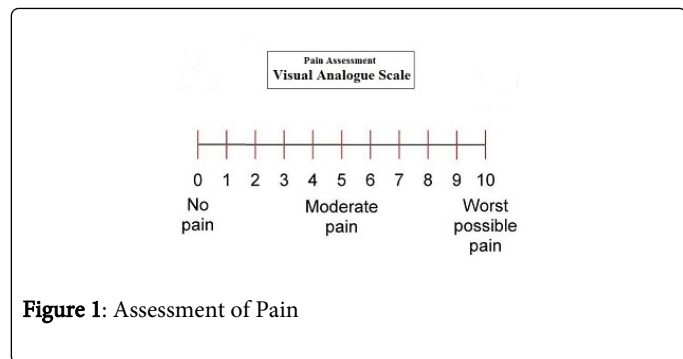
forms of VAS. It can be presented as horizontal lines or vertical lines, thick line of blocks like bricks laid end to end with 11 categories, ranging from 0-10 [5].

Do patients with closed fractures in the emergency room that were given standard protocol of fracture management (reduction and immobilization) and injection of ketorolac as single analgesia report significant decreased of pain severity? The aim of this study was to assess whether the combination of reduction, immobilization, and injection of non-steroidal anti-inflammatory drug is sufficient enough to manage pain in the acute setting of closed fractures in the emergency room.

Materials and methods

This was an observational study with review of clinical databases conducted on a consecutive series of patients in the emergency department of Sardjito general hospital from August to September 2012. The inclusion criteria were patients older than 18 years old with isolated closed fracture either in the upper extremity, lower extremity, or clavicle. Patients who had multiple trauma, multiple fractures, open fracture, mental disease, peripheral neuropathy, and stroke were excluded from this study. After taking the consent from the subjects, the pain was assessed using VAS to measure the severity of pain based on patient's perspectives. The subjects were asked to determine the

level of pain subjectively by giving mark to horizontal line within 10 cm line (1 point is equivalent to 10 mm) with the description of no pain in one side (score 0) and worst possible pain in another side (score 10) (Figure 1).



This study was divided VAS into 3 categories, mild pain (0-3), moderate pain (4-6), and severe pain (7-10).

Standard protocol of fracture management in the emergency department in the form of provisional reduction and immobilization was applied by orthopedic residents and injection of ketorolac 30 mg intravenously was given to the subjects. VAS score was reevaluated by the same examiner face to face, 24 hours after intervention to measure whether there was decrease in the severity of pain. The location of injury was divided into 3 categories as follows: clavicle, upper extremity, and lower extremity based on classification for fractures of long bones [6]. Data were analyzed using Chi-square test to determine the differences of pain as reflected by VAS score (categorical data) before and after the interventions. Significance was defined when $p < 0.05$.

Results

There were 61 eligible patients who met the criteria and willing to participate in this study. Table 1 showed that most of the subjects were male (57.4%) with the most common mechanism of injury is due to road traffic accident (68.9%). The location of the injury of the subjects in this study at most is at the lower extremity (49.2%).

Characteristics	n (%)
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	Upper Extremity			Lower Extremity			Clavicle		
	Before	After		Before	After		Before	After	
Mild	0 (0%)	13 (54.16%)	P<0.001	0 (0%)	19(63.33%)	P<0.001	0 (0%)	5 (71.43%)	P 0.016
Moderate	9 (37.50%)	11 (45.83%)		14 (46.6%)	11(36.67%)		5 (71.43%)	2 (28.57%)	
Severe	15 (62.5%)	0 (0%)		16(53.3%)	0 (0%)		2 (28.57%)	0 (0%)	
	24 (100%)	24 (100%)		30 (100%)	30 (100%)		7 (100%)	7 (100%)	

Table 4: Pain severity before and after the interventions were given in upper extremity, lower extremity and clavicle

The results showed that in all groups, the pain severity had significantly decreased after the interventions (Table 4).

Sex	Male	35 (57.4%)
	Female	26 (42.6%)
Mechanism of Injury	Road Traffic Accident	42 (68.9%)
	Domestic Accident	19 (31.1%)
Fracture location	Upper extremity	24 (39.3%)
	Lower extremity	30 (49.2%)
	Clavicle	7 (11.5%)

Table 1: Characteristic of the subjects based on Sex, Mechanism of Injury, and Fracture Location

Pain severity in upper extremity injury, lower extremity injury, and clavicle injury for both, before and after interventions were given was not significantly different with p value more than 0.05. Most of the subjects had severe pain before the interventions (Table 2), while after the interventions were given there were no subjects that had severe pain (Table 3).

n	Mild	Moderate	Severe	P 0.283
Upper extremity	0	9	15	
Lower extremity	0	14	16	
Clavicle	0	5	2	

Table 2: Pain severity before the interventions was given based on the location of injury

n	Mild	Moderate	Severe	P 0.652
Upper extremity	13	11	0	
Lower extremity	19	11	0	
Clavicle	5	2	0	

Table 3: Pain severity after the interventions was given based on the location of injury

Discussion

In the emergency setting, an assessment and documentation of pain become the first step to diagnose and evaluate the outcome. Pain can be evaluated through various tools. VAS is easy to use in a variety of

practice settings. It sensitive to evaluate treatment effects and the data can be analyzed using parametric statistical techniques [7,8]. VAS is subjective because the scale is from the perspective of patients, thus good communication between patient and health worker needs to be concerned to have a result that can reflect the severity of pain felt by patients [9]. Several studies showed that minimal clinically significant difference in VAS pain scores should be around 9-13 mm [10,11].

In acute fracture cases (Beel et al.) showed that actually 88% of the patients required pain medication is given in the emergency department. They required immediate pain management [12]. A study conducted by Lewis et al. showed that only 121 out of 401 (30%) patients with acute bone fractures in 8 emergency departments received analgesia and indicated that the physician failed to acknowledge and manage patient's pain [13]. Another study where 172 children presented with acute limb fractures, only 84 patients received analgesic medication while in the emergency department [14].

Inadequate management of acute pain in emergency department can be due to several reasons. Those are failure to acknowledge and assess initial pain, failure to have pain management guidelines and its outcome measurement in emergency department and because of pain is an individual emotional experience, the management of pain should be correlated with patient's expectations. The documentation of pain assessment was equally essential in emergency department to improve quality of therapy [2].

Pain felt by the subjects in this study has not significantly different based on its location of injury. Before the interventions were given, whether in the upper extremity, lower extremity and clavicle, pain was in moderate and severe level, while there was no subjects had mild pain. It also had similar pattern based on its location when the interventions had already given. In general, the subjects had only mild and moderate pain, but no severe pain.

Early pain control in acute pain is recommended because it can limit the extent and break the cycle of pain [15]. The management of acute pain itself may consist of different combination based on its etiology. For fractures cases, further damage to the soft tissue due to pressure on adjacent neurovascular structures can occur when displaced fractures are not realigned (restore into the normal anatomical alignment) [16]. After the administration of adequate analgesia, immediate realignment should be undertaken followed by immobilization with repeated neurovascular assessment [17].

For severe pain, morphine is the gold standard analgesic in emergency due to its potent analgesic effect. However it has various side effects. Because of that reason, opioids had the potential to be replaced by NSAID in the treatment of severe pain [18]. In post-traumatic settings, the analgesic potency of NSAID is well proven. Beside its analgesic properties, NSAID also has antipyretic and anti-inflammatory properties. The mode of action is mainly due to inhibitory effect of prostaglandins enzymatic production which is beneficial in fracture cases where local release of prostaglandin occurs early as a result of the acute aseptic inflammatory response [19]. Ketorolac is one of the examples of NSAID. A study was conducted using VAS score, to evaluate severity of pain at baseline and 24 hours after showed that non-steroidal anti-inflammatory drugs including ketorolac were effective for pain relief in ankle fracture cases [20]. Another study also showed that ketorolac given intravenously has equally effective as morphine in the management of surgical pain and pain related to cancer, with the advantages of fewer side effects [21].

This study showed that combination of early reposition, immobilization, and ketorolac injection were sufficient enough in managing acute pain of isolated closed fractures due to injury. Severe pain in upper extremity, lower extremity, and clavicle had value of 62.5%, 53.3%, and 28.57% respectively. However, there were improvement that marked by 0 percentage of severe pain in those 3 categories after interventions were given. Mild pain has increased in number from 0 percentages to 54.16% in upper extremity, 63.3% in lower extremity, and 71.43% in isolated closed fracture of clavicle.

This study was conducted on consecutive patients in same institutions, similar examiner and tools for assessing pain severity before and after interventions. Therefore, it can be used as one of references for emergency department doctors in acute pain management of closed fracture. Although most of the patients with fracture showed severe pain, this study showed that injection of ketorolac as single analgesia in combination with early provisional reduction and immobilization was sufficient to reduce the pain. However, this study has some limitations with the small sample size and different ages of subjects, so larger sample is required for further study.

Conclusion

This study showed that severity of pain felt by the subjects was not significantly different in upper extremity, lower extremity, and clavicle. The combination of early reposition, immobilization, and ketorolac injection had significantly reducing pain severity in this study. Thus, those management was sufficient for acute management of isolated closed fracture cases.

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