

## The definition of recurrent shoulder dislocation in tramadol induced seizure patients

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### Abstract

**Background:** Prevalence of recurrent shoulder dislocation in patients taking tramadol has not been studied yet; so, this study aims to study the recurrent shoulder dislocation following tramadol induced seizure.

**Methods:** In this cross-sectional study, 205 patients with recurrent shoulder dislocation complaints (2 or more) referred to Shafa Orthopedic and Iranmehr hospitals Tehran, Iran, from October 2012 to October 2014 were studied. Data on patient history and physical examination, patient demographic information such as age, sex, age at first dislocation, total number of dislocation, cause of the first dislocation, history of tramadol use, number of dislocation following tramadol induced seizure, history of other drugs use, the dominant hand, involved side, direction of dislocations and greater tuberosity fracture was recorded using a pre-designed questionnaire. Categorical variables were compared by chi-square test and the means were compared with student T-test.

**Results:** In this study, 50 patients (24.4%) suffered from tramadol induced seizures and recurrent shoulder dislocation. Results showed that there was a significant relationship between the number of dislocation and tramadol use ( $P = 0.02$ ). Recurrent shoulder dislocation following tramadol induced seizure was significantly associated with greater tuberosity fracture of humerus ( $P = 0.04$ ); in 49 out of 50 patients (98%) dislocation was of anterior type.

**Conclusion:** The findings of this study suggest that tramadol induced seizure may increase the risk of recurrent shoulder dislocation. Furthermore, the prevalence of greater tuberosity fracture in shoulder dislocation increases following tramadol induced seizure; and anterior shoulder dislocation is the most common type of dislocation following tramadol induced seizure.

**Keywords:** Recurrent shoulder dislocation, Tramadol, Seizure.

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### Introduction

Tramadol is a synthetic analgesic medicine with central function and opioid receptor agonist (1- 4). It was first produced in Germany in 1970 and gradually used all over the world to control moderate to severe pain (3,4). Since 2002 tramadol was used in Iran after the Food and Drug Administration's approval (5). Concurrent with the introduction of the drug into the market, its abuse by different age groups was oc-

curred, especially youth; so that there is less medical emergency that is not faced with over dose and side effects of tramadol (5,6).

Tramadol side effects include: pinpoint pupils, fatigue, dizziness, headache, visual disturbances, nausea, vomiting, euphoria, dysphoria, hallucinations, seizures and apnea (2). Studies have shown that tramadol induced seizures can occur with therapeutic dose (7). Furthermore, some studies have

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shown that 15 to 35 percent of patients with tramadol over dose have seizures. Tramadol-induced seizures like many other drug-related seizures are generalized tonic-clonic with low self-limited duration (5).

Trauma is one of the major complications following seizure so that Faraji Dana et al. stated that 24.6 percent of patients with seizures after taking tramadol suffer from trauma (8). Shoulder dislocation is another problem caused by seizures. Shoulder dislocation is generally of anterior and posterior dislocation caused by seizures, electric shock, or face direct trauma (8,9). Robinson et al., in their study stated that 17.7 percent of patients with shoulder dislocation are in danger of its recurrence (10). In another study Ulfink et al., showed that about 50 percent of patients with a history of shoulder dislocation face shoulder dislocation following the seizure (11). Given that the prevalence of recurrent shoulder dislocation in patients taking tramadol has not been studied, this study aimed to evaluate the recurrent shoulder dislocation following tramadol induced seizure and the potential difference with other recurrent shoulder dislocations.

### Methods

This cross-sectional study conducted on 205 consecutive patients referred to Shafa Orthopedic and Iranmehr hospitals Tehran, Iran, from October 2012 to October 2014 with complaints of recurrent shoulder dislocation (2 or more episodes). Data on patient history and physical examination, patient demographic information such as age, sex, age at first dislocation, total number of dislocation, cause of the first dislocation, history of tramadol use, number of dislocation following the tramadol induced seizure, history of other drugs use, the dominant hand, involved side, direction of dislocations and greater tuberosity fractures was recorded using a pre-designed questionnaire. All aspects of the study involving ethical issues were explained to patients and oral and written consent and the right to withdraw from the study were obtained.

The study protocol was approved by ethical committee of Iran University of Medical sciences.

Inclusion criterion was complaints of recurrent shoulder dislocation and exclusion criteria were history of epilepsy, use of anti-epileptic drugs, neurological diseases caused by trauma, and brain tumors.

Data from data sheet were encoded and analyzed by SPSS version 21.0 (SPSS Inc, Chicago, Illinois, the United States) software, using independent samples t-test, ANOVA and Chi-Square test. The  $p \leq 0.05$  was considered significant.

### Results

In this study, 205 patients including 184 male (89.8%) and 21 female (10.2%) were studied. The mean  $\pm$  SD age of the subjects was  $26.81 \pm 5.70$  yrs (age range: 17-40 yrs). There was no significant relationship between age and sex of the subjects ( $p=0.42$ ). The mean  $\pm$  SD age of the subjects at the first shoulder dislocation was  $23.85 \pm 5.03$  (age range: 15-39 yrs)

The mean  $\pm$  SD age of patients after taking tramadol and tramadol induced seizures with recurrent shoulder dislocation was  $25.80 \pm 5.28$  and the mean age of patients who do not take tramadol was  $27.14 \pm 5.81$ , respectively. T-test showed that there was no significant relationship between age and recurrent shoulder dislocation following tramadol induced seizure ( $p=0.13$ ).

Fifty patients (24.4%) suffered from recurrent shoulder dislocation caused by tramadol induced seizures (OR= 3.09; 95% CI: 2.71-3.29). Table 1 shows the number of dislocations in patients with recurrent shoulder dislocation caused by tramadol induced seizures, and patients who do not take tramadol separately. The findings showed that there was a significant relationship between the number of dislocation and tramadol consumption ( $p=0.02$ ).

In this study, 200 patients (97.6%) suffered from anterior shoulder dislocation and 5 patients (2.4%) suffered from posterior shoulder dislocation. Analysis showed that there was no significant relationship

Table 1. Prevalence and frequency of shoulder dislocation in patients with and without a history of tramadol use

Total dislocations	Patients without tramadol use	Patients with tramadol use
2 to 5	(9/12%) 20	(10%) 5
10 to 6	4/37%) 58	(20%) 10
50 to 11	(49%) 76	(66%) 33
More than 50	(6/0%) 1	(4%) 2

Table 2. Frequency of shoulder dislocation in shoulder dislocation in patients with and without a history of tramadol use

Group	Posterior dislocation	Anterior dislocation
Patients with tramadol use	1 (2%)	49 (98%)
Patients without tramadol use	4 (2%)	151 (97.4%)

between tramadol induced seizures and dislocation direction ( $p= 0.63$ ). Among patients with recurrent shoulder dislocation following tramadol induced seizures 1 patient suffered from posterior dislocation (2%) and 49 patients (98%) had anterior shoulder dislocation, (Table 2).

Eighteen patients (8.9%) suffered from greater tuberosity fracture concurrent with recurrent shoulder dislocation; in 8 patients (44.4%) is followed by tramadol induced seizure. Statistical analysis showed a significant relationship between recurrent shoulder dislocation followed by tramadol induced seizure and greater tuberosity fracture ( $p= 0.04$ ).

### Discussion

Tramadol is a medicine that can completely cross the blood-brain barrier. Maximum plasma level is one hour and a half with about 5 to 6 hours half-life. Therapeutic blood levels in adults are about 300-100ng/ml (0.2 to 0.1 $\mu$ g/ml). The maximum recommended dose of the drug in adults is 400 mg / day. Seizure is one of the adverse effects of tramadol use, abuse or over dose (2,12,13). It has been proved that tramadol induced seizure is not dose-related and the seizure can be recurrent (4,8,15). Spiller et al. (16) reported 1.1% prevalence of recurrent tramadol induced seizure. Petramfar et al. (8) reported the prevalence of 1.9 % while Gudarziet al. (17) and Farajidana et al (18) reported prevalences of 35% and 10.8 %, respectively. There is no study aimed to investigate the prevalence of recurrent shoulder dislocation caused by tramadol induced seizure and this study is the first study of its kind.

The study findings showed that 24.4 percent of patients suffered from recurrent shoulder dislocation caused by tramadol induced seizure after taking tramadol. Moreover, there was a significant relationship between the number of subject's dislocation and tramadol use.

Nakhaei Amroodi et al. (19) studied the prevalence of anterior shoulder dislocation following tramadol induced seizure in 15 patients. They stated that 20.83% of patients suffer from recurrent shoulder dislocation followed by tramadol induced seizures.

Farajidana et al. (8) studied trauma-induced seizures followed by tramadol use and reported that 4.3 percent of 232 patients had shoulder dislocation. They added that shoulder dislocation is the most common trauma followed by tramadol induced seizures after head injury. Buhler et al., (20) studied shoulder instability in patients with epilepsy, and stated that 47% of 26 patients suffer from recurrent shoulder dislocation. They stated that shoulder recurrent dislocations in 13 patients (50%) were of anterior type.

As indicated, there are different statistics reported by different studies on shoulder dislocation following seizure. The current study of 205 subjects has the largest number of included subjects. The treatment of shoulder recurrent dislocation is complex due to glenoid injury, soft tissue injury and high rate of treatment failure (21). Accordingly, it seems there is a significant relationship between the number of shoulder dislocations and tramadol induced seizure.

In this study 2.4% of patients suffered from posterior shoulder dislocation. Many

studies indicated that posterior shoulder dislocation is the most common dislocation after seizure, while in the current study only 2% (1 patient) of dislocations was posterior among 50 patients with recurrent shoulder dislocation following tramadol induced seizure.

Nakhaei Amroodi et al. (19) stated that shoulder dislocation following tramadol induced seizures in 100% of patients was anterior type. Farajidana et al. (8) also reported similar results in their study. Buhler et al., in another study on 26 patients stated that most shoulder recurrent dislocations in patients with epilepsy were anterior (20).

Posterior shoulder dislocation is rare; it constitutes only 2.1 of shoulder dislocations (22). It seems that the prevalence of posterior shoulder dislocation in patients following seizures needs broader studies.

In the current study, 18 patients (8.9%) with recurrent shoulder dislocation suffered from greater tuberosity fracture and 8 of them were following tramadol induced seizure. According to statistical analysis there was a significant relationship between greater tuberosity fracture and recurrent shoulder dislocation following tramadol induced seizure.

Nakhaei Amroodi et al., in their study stated that seizure caused by the use of tramadol is associated with greater tuberosity fractures (19). In another study, Desaei et al., stated that proximal humerus fractures was 4.2 times more common in patients with seizure (23). Hovelius et al., in their study stated that 12.4% of their patients suffered from greater tuberosity fracture with anterior shoulder dislocation (24).

Greater tuberosity fracture is generally the result of recurrent shoulder dislocation or direct trauma without dislocation and can lead to shoulder joint impairment of motion especially abduction and also damage to rotator cuff (25-27). This problem needs more attention and may need surgery for reduction and fixation of tuberosity.

### Conclusion

Based on the findings of this study, tra-

madol use and tramadol induced seizure may increase the risk of recurrent shoulder dislocation. The prevalence of concurrent greater tuberosity fracture increases following the tramadol induced seizures. The current study and some other similar studies show that anterior shoulder dislocation following tramadol induced seizure is the most common type; thus, association between seizure and direction of shoulder dislocation should be investigated in broader and more specific studies.

### Conflict of interest

The authors have no potential conflict of interests to declare.

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