

## The Report of Suicide by Ingestion of Lidocaine Topical Spray

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### ABSTRACT

**Background:** Lidocaine is a local anesthetic and antiarrhythmic agent. There are reports on accidental and intentional cases of poisoning following injection of lidocaine while rare are the fatal cases realized after oral ingestion of lidocaine. Suicidal poisoning with lidocaine pharmaceutical formulations is rare since no pharmaceutical dosage forms for oral use are available except gels and sprays used as local anesthetics in dentistry.

**Cases:** Three cases of suicidal poisoning by ingestion of the content of lidocaine topical spray are reported in the present study. The cases developed episodes of seizure requiring diazepam and other therapeutic modalities upon admission. Eventually, one of the cases expired .

**Conclusion:** To the best of our knowledge, this study is the first reported case of suicidal poisoning after ingestion of this formulation which highlights the fact that lidocaine topical spray formulation may be used for committing suicide. Ingestion of lidocaine present in topical spray can induce varying levels of toxicity that can even be fatal .

**Keywords:** Ingestion, Lidocaine, Poisoning, Suicide, Topical Spray.

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### INTRODUCTION

Lidocaine is commonly used as a local anesthetic and antidysrhythmic agent [1]. Several accidental and intentional poisonings following intravenous injection, ingestion, or topical mucosal application of lidocaine have been reported [2-11]. In previous reports, parenteral formulations of lidocaine were the common source of accidental and intentional poisoning [2-9]. To the best of our knowledge, there are no reports on ingestion of topical spray formulation of lidocaine in a suicidal attempt. This study reports three cases of lidocaine poisoning after ingestion of topical spray formulation as a suicidal attempt .

### CASES

**Case 1:** An 18 year-old female presented to the emergency ward with decreased level of consciousness. In the history, she had broken the cap of the lidocaine topical spray (10%) and had ingested 100 mL of its content intentionally.

Her family found her with seizure. They transferred the patient immediately to the nearby hospital. She was intubated for airway protection, and the standard treatment for controlling status epilepticus was done .

About two hours after controlling the seizure, she was transferred to our hospital which is a referral center for intoxicated cases, and admitted in the Intensive Care Unit (ICU) for further monitoring and treatment.

Upon arrival, she was unconscious with Glasgow Coma Scale (GCS) 12 of 5/15. Her initial vital signs were stable with blood pressure (BP): 100/70 mmHg, pulse rate (PR): 90/minute, auxiliary temperature (TA): 37.7oC, and respiratory rate (RR): 14/minute. Pupils were dilated with no reactivity but symmetric. Other physical examination showed no abnormalities .

Oxygen saturation was 95%. Chest X-ray, electrocardiography (ECG), and brain Computed Tomography Scan (CT scan) were normal. In her past medical history, she had no underlying diseases like as epileptic disorders, any drug history or co-ingestion .

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The results of toxicological tests on blood and urine samples showed phenobarbital serum level of 3.9  $\mu\text{g/mL}$  and phenytoin serum level of 9.8  $\mu\text{g/mL}$  which were in the therapeutic range due to the treatment of status epilepticus. The treatment was supportive and symptomatic. No dysrhythmia was detected during hospitalization. She remained seizure-free and was successfully extubated the next day and transferred to the ward. She discharged three days after admission.

**Case 2:** A 27 year-old male presented to the emergency ward with coma and cardiac arrest. In the history, he had seizure attacks one hour after the intentional ingestion of 200 mL of lidocaine topical spray (10%). After Cardio Pulmonary Resuscitation (CPR) for 15 minutes, he had sinus rhythm and was intubated for airway protection and then admitted to the ICU for further management.

The vital signs on admission in ICU were BP: 120/80 mmHg, PR: 121/minute, and TA: 37.5°C. Pupils were midsize and reactive. Other physical examinations were normal.

The result of arterial blood gas (ABG) after CPR was pH=6.60,  $\text{HCO}_3=5.7$  mEq/L,  $\text{PCO}_2=58$  mmHg and  $\text{SpO}_2=82\%$ . The latest ABG was pH=7.35,  $\text{HCO}_3=31$  mEq/L,  $\text{PCO}_2=55$  mmHg, and  $\text{SpO}_2=99.2\%$ . Chest X-ray, ECG, and brain CT scan were normal. In the past medical history, she had no underlying diseases, like as epileptic disorders, any drug history, and co-ingestion.

The results of toxicological tests on blood and urine samples were negative for drugs and chemicals except phenobarbital and phenytoin. The treatment was supportive and symptomatic but unfortunately the patient died in the third day of admission due to multi-organ failure.

**Case 3:** A 25 year-old male was referred to the emergency ward with unconsciousness, hypotension, gastrointestinal bleeding, and seizure. He had ingested all content of three lidocaine topical spray as a suicidal attempt (approximately 100 mL of lidocaine 5% and 200 mL of lidocaine 10%). Consequently, he ended up in convulsive seizures. He was treated with diazepam and dopamine in standard doses.

Moreover, he was intubated for airway protection. Then he was transferred to our hospital and admitted to the ICU for further management.

On admission, his BP was 63/36 mmHg with a PR: 111/ minute. The pupils were symmetric and mydriatic with light reaction. Chest X-ray, ECG, and brain CT scan findings were normal. In ABG, his blood was pH=7.27,  $\text{HCO}_3=20.3$  mEq/L,  $\text{PCO}_2=43.3$  mmHg, and  $\text{SpO}_2=80\%$ . He had no history of epileptic disorders and underlying diseases.

In ICU, phenobarbital (15 mg/Kg loading dose, then 1-3 mg/Kg/hr IV continuous infusion) and sodium valproate (400 mg, every eight hours, via nasogastric tube) were administered for seizure control. Other supportive and symptomatic therapeutic measures were taken. In the next day, Intralipid® 10% (2 mL/Kg as a loading dose, 0.5 mL/Kg/min for four hours) was administered. On the 6th day of admission, he remained stable and was discharged.

## DISCUSSION

This study reported three cases of suicidal poisoning by ingestion of the content of topical lidocaine spray. There are scant cases of oral lidocaine toxicity [2-11] and to the best of our knowledge, these cases are the first report of suicidal poisoning by ingestion of the content of lidocaine topical spray. Previous reports demonstrated that the injectable forms of lidocaine were used as the source of accidental and/or intentional poisoning [2-9]. These cases are the only reports in the literature that presented with seizure after suicidal ingestion of lidocaine topical spray formulation.

In general, central nervous system (CNS) and cardiovascular and hematologic systems are involved in lidocaine toxicity [12]. The initial symptoms include tinnitus, dizziness, disorientation, excitement, speech changes, nystagmus, lightheadedness, agitation, and confusion. Tachycardia and hypertension may occur as an early physiological response. In severe cases, seizure, coma, respiratory depression, bradycardia, ventricular dysrhythmia, and asystole have been reported [11-12]. Asystole has been reported in patients who received

unintentional intravenous injections of 800-1000 mg of lidocaine [13]. Seizure occurred prior to cardiac arrest in most patients. Thus, CNS toxicity should be considered as a warning sign for cardiac toxicity [14]. In general, systemic toxicity of lidocaine correlates with plasma concentration. It was demonstrated that CNS toxicity develops at a lower plasma concentration than is needed to produce cardiac toxicity. Plasma concentrations of 5-10 µg/mL may be associated with marked CNS toxicity and higher levels may produce coma, apnea, and cardiovascular collapse [12].

The minimum intravenous toxic dose of lidocaine is 6.4 mg/Kg [15]. There are cases of ingestion of 5 to 25 mL of lidocaine (2%) in children which resulted in seizure [16]. In another report, accidental ingestion of 30 mL topical lidocaine (1.2g) in a 74-year old woman caused CNS toxicity [11]. In our cases, seizure was an important clinical symptom after intentional ingestion of 10-25g of lidocaine .

In spite of ingestion of high amount of lidocaine in our cases, no cardiovascular effects were detected. This may be due to the route of exposure in these cases. Lidocaine undergoes extensive first-pass hepatic metabolism with a bioavailability of about 35% via oral administration which can produce a low blood level of lidocaine. Unfortunately, lidocaine blood level could not be determined in these cases and it is the main limitation of this study.

## CONCLUSION

Lidocaine topical spray formulation may be used in suicidal attempts. Ingestion of lidocaine that exists in topical spray could induce adverse clinical effects in the patients which can be fatal. Hence, the patients should be monitored closely.

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