

# Acute compartment syndrome as a complication of mosquito repellent toxicity—a case report

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## ABSTRACT

**Background:** The aim of this study was to understand the local manifestations and complications of mosquito repellent toxicity.

**Case Presentation:** A 16-year-old female presented to the emergency department with the complaints of severe pain over the left upper limb, with tense swelling and difficulty in movement. On the evaluation of history, the patient confirmed to have injected 2 ml of mosquito repellent “Good Knight” liquid into the flexor aspect of the left forearm just above the wrist joint a week back, and she gradually developed swelling and pain, for which she was being treated elsewhere. She was brought with restricted movement of the wrist joint with moderate pain and swelling extending up to the elbow region.

**Conclusion:** In this case, the patient had injected around 2 ml of mosquito repellent liquid into the anterior compartment of the forearm above palmar carpal ligament. This solution is an acidic, toxic solution that causes irritation in skin tissues, in which one gets a direct exposure. This patient developed acute compartment syndrome which could have further led to Volkmann's contracture. Such chemical irritants can lead to life-threatening scenarios if left untreated and may irreversibly damage the structures that they have been exposed to. Timely intervention to release the compartment pressures may help to save the limb deformity or limb loss.

**Keywords:** Mosquito repellent toxicity, prallethrin toxicity, acute compartment syndrome, case report.

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## Background

Pyrethroid insecticides are very widely used in agriculture and household due to their high effectiveness and low toxicity in humans. Despite their extensive worldwide use, there are a few reports of human pyrethroid poisoning [1]. The poisoning has a varied presentation and its symptoms overlap with those of other compounds, which can lead to misdiagnosis. We present a case of poisoning with prallethrin, a pyrethroid compound, commonly available as Good Knight vaporizer [2]. Prallethrin belongs to the pyrethroid group, which affects the central and peripheral nervous system and interact with voltage-gated sodium channels altering neuron firing, leading to neurotoxicity [3]. Mosquito repellent aerosol liquid also contains various compounds such as a solvent, propellant, and miscellaneous ingredient. The solvent such as ethanol and propanol are most commonly used, whereas hydrocarbons such as propane and butane constitute as a propellant, and also, various oils such as peppermint oil and citronella oils are added for providing a pleasant odor to the liquid. All these substances have irritant properties if one gets exposed and cause inflammation. Although poisoning cases with systemic manifestations have been reported worldwide, no patients have presented with local clinical manifestations

due to infiltration of mosquito repellent into the body parts including compartment syndrome.

## Case Presentation

A 16-year-old female presented to the emergency department with the complaints of severe pain over the left upper limb, with tense swelling and difficulty in the movement of extremities. On evaluating the history, the patient confirmed to have injected 2 ml of “Good Knight” liquid into the flexor aspect of the left forearm just above the wrist joint a week back, and she gradually developed swelling and pain, for which she was being treated elsewhere and received non-steroidal anti-inflammatory agents such as diclofenac sodium and paracetamol for pain. She also applied some local pain balm and some turmeric powder paste to counter the pain and swelling.

Local examination revealed tense swelling and stony hard tenderness over the left forearm along with the restricted movement of the forearm, wrist, and hand (Figure 1). Both radial and ulnar pulses were palpable, she had developed contracture of the digits, and she was not able to perform opposition movement with her thumb and fingers but had preserved sensory function and could

sense touch, pressure, temperature, and pain. Her routine blood investigations were within normal limits, and an X-ray did not show any evidence of fractures or signs of osteomyelitis. To relieve the tension caused by compartment syndrome, she was taken for fasciotomy; on incision, there was tense swelling in the soft tissues including muscle swelling; and furthermore, wound exploration, debridement, and partial closure were done (Figure 2). The patient responded well to the surgical intervention with improvement in the motor function and relieving of pain. She was kept on painkillers, antibiotics, and symptomatic treatment for the next couple of days. Skin grafting was done after 10 days (Figure 3). The patient recovered well with no neurovascular deficit and discharged. She was well in her follow-up and did not develop any permanent damages to her limb.



**Figure 1.** Showing the injection site a little over wrist along with swelling of left forearm, wrist & hand.



**Figure 2.** Fasciotomy incision, with swelling of underlying structures.



**Figure 3.** Closure of wound & skin grafting.

## Discussion

Acute compartment syndrome is caused by elevated pressure within the compartment separated by fascia usually seen in trauma, burns, crush injuries, and snake venom exposure. In this case, the patient had injected 2 ml of mosquito repellent liquid into the anterior compartment of the forearm above palmar carpal ligament. This solution is an acidic, toxic solution which causes an irritation in skin tissues, in which one gets a direct exposure. The toxic effect of all the ingredients of the mosquito repellent liquid led to the severe irritation of the soft tissues of the forearm and wrist, thereby leading to acute compartment syndrome.

There have been few reports of pyrethroid poisoning, but most of them are of occupational poisoning. The clinical manifestations of this solution if injected into the soft tissues have not been reported. In this case, we saw that there was tense swelling of the left upper limb extending from the lower part of the arm to the digits. She took pain killers and supportive treatment which did not provide any relief. This patient could have developed Volkmann contracture if the timely surgical intervention were not performed.

On wound exploration and fasciotomy, there was tension in the entire anterior compartment, along with swelling of the flexor muscles and few dead tissues, for which debridement was also done. However, there were no signs of the wound being infective, and there was no pus collection on wound exploration. This patient took around 3–4 days to develop the tension in the forearm compartments and was brought only after she developed restricted movement and severe pain in the affected limb. If it had been left untreated, the patient may have developed permanent damage to the limb or could have the loss of a limb due to the compartment syndrome. Any swelling into the compartment spaces should be treated with promptness as any delay may further lead to progression to acute compartment syndrome, contractures, and permanent loss of limb function. This patient had complete recovery without any neurovascular deficit due to surgical intervention. Swelling due to such chemical irritants can lead to life-threatening scenarios if left untreated and may irreversibly damage the structures that they have been exposed to.

### What is new?

Such a presentation of mosquito repellent toxicity has not been reported. The presentation is atypical. Despite local symptoms, there are no systemic manifestations of the mosquito repellent toxicity.

**Consent for publication**

Written informed consent was taken from the patient.

**Ethical approval**

Ethical approval is not required at our institution for publishing an anonymous case report.

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**Summary of the case**

1	<b>Patient (gender, age)</b>	Female, 16 years
2	<b>Final diagnosis</b>	Acute compartment syndrome as a complication of mosquito repellent toxicity
3	<b>Symptoms</b>	Pain, swelling, and restricted movement left forearm and hand
4	<b>Medications</b>	Non-steroidal anti-inflammatory drugs—paracetamol and diclofenac sodium
5	<b>Clinical procedure</b>	Fasciotomy
6	<b>Specialty</b>	Emergency Medicine/orthopedic surgery