Case Report

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Management of Suicidal Parenteral Injection of Pesticide Deltamethrin

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Abstract

Introduction: Pesticides and insecticides are easily accessible in India as a predominantly agrarian population reside. This has resulted in unregulated selling of these compounds and is often the cause of poisoning due to accidental, suicidal or homicidal motive. Though commonly ingested, people do find innovative ways to administer these compounds. Such instances are scarcely described in medical literature l*et al*one the prescribed management.

Case Report: We present a case of suicidal parenteral injection of pyrethroid ester insecticide (Deltamethrin) into left upper limb. Initially the patient and relatives tried to masquerade it as a case of an insect bite but the clinical features painted a suspicious picture.

Conclusion: This rare case account is the first description of parenteral deltamethrin poisoning and portrays the management of such a patient and reviews literature pertaining to parenteral pesticide poisoning. Our case management yielded successful salvage of the involved limb with fasciotomy, multiple debridement and NPWT followed by skin grafting with a considerable lengthy hospitalization for the patient and laborious treatment on the part of treating physicians.

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Introduction

In today's life, due to increase stress and less interpersonal interaction, human population is witnessing increase in suicide rates mainly due to social pressure and family conflicts. This is especially true in the young adult population. Suicide is complex with social, environmental, psychological, cultural and biological factors being involved and is among the three leading causes of death in the world.[1] Compounding this fact is that in agro-based societies such as India, pesticides and insecticides are readily available unregulated. Ingestion of these compounds is the most common mode of suicide and sometimes homicide deaths.[2] Also accidental exposure by inhalation or absorption through skin (dermal contact), due to spraying in fields, as an occupational hazard, is also common mode of poisoning. However now and then, people do find innovative ways of administering these substances. Parenteral route of administration is a rare route used for administration of pesticides.[3, 4] This may be due to the fact of thinking by people that injecting these substances rather than ingesting may cause swifter death and hence less suffering or in case of homicide to mimic insect or reptile bites.

Though insecticide poisoning through parenteral route have been reported scarcely in medical literature, none of these cases were due

to pyrethroid as in this case but were because of organophosphates.[3] Poisoning due to deltamethrin is very uncommon due to the fact that pyrethroids, though potent insecticide, are regarded to have lower toxicity compared to organophosphates and organochlorates. However, it necessitates the treating physician to differentiate poisoning due to pyrethroid, organophosphate and organochlorine, as despite several likenesses in clinical presentation among these compounds poisoning, treatment for each is different.

Limited case accounts have been reported around the world but yet medical literature is scarce in incidence of parenteral injection of pesticides, leave alone standard management being prescribed.[3, 4] This is one of the first incidence being reported of use of synthetic pyrethroid, deltamethrin for this intent. This case study emphasizes the need for the attending medical professional to be on toes and not to always believe in patient's history alone.

Case Report

A 24-year-old unmarried male presented to the casualty with history of reptile/insect bite to his left forearm, after which he developed severe pain at site, bluish black discoloration of the forearm, fever and vomiting. Patient had been previously treated in a private nursing home for snake bite with polyvalent antisnake venom and then referred to a government tertiary hospital for further management. In the state run tertiary care center, patient was advised limb amputation in view of the rapidly progressing signs and symptoms. Unwilling for amputation patient presented to our center, 2 days after the alleged reptile bite. On presentation patient was delirious had tachycardia, tachypnea with shallow breathing, temperature of 102.3 ^{0} F and blood pressure of 80/50 mm Hg. Patients left forearm was tense, with gangrene patch over volar surface of left forearm and surrounding bluish discoloration extending to hand and forearm. The area was extremely tender and warm. Vascularity of the finger tips was satisfactory. Peripheral pulses were difficult to appreciate owing to the tense forearm and wrist. Patient was wheeled to intensive care unit and supportive therapy started. Since the emergency team found something amiss from the framed history and presenting features, patient's attendees were interrogated thoroughly citing worsening of the patient condition and his imminent death if proper treatment were not to be initiated promptly. That is when it was revealed that the patient had injected insecticide, Deltamethrin, after argument with his mother. To threaten his mother, patient had injected around 10–15 cc of the compound. This history was conveniently hidden by patient's attendees and was failed to be elicited by medical staff in previous hospitals.

During his stay in intensive care unit, patient had few episodes of vomiting. Patient was put on supportive treatment and was administered low dose of atropine. Once stabilized patient was taken for debridement. Patient underwent a total of 9 sittings of serial debridement with negative pressure wound therapy. Patient at the end of multiple surgeries had lost flexor digitorum superficialis and flexor digitorum profundus to all fingers along with pronator teres, flexor carpi radialis and medial nerve on the volar aspect. On the dorsal aspect of left forearm, extensor digitorum communis to index, middle and ring fingers along with extensor indices proprius and extensor carpi radialis longus were lost due to necrosis. Patient also had multiple fasciotomy wounds over left arm. Patient was kept on a close watch for systemic toxicity throughout his stay in the hospital. Finally after 41 days of hospitalization, patient underwent skin grafting with 100% take up and was discharged 10 days later with regular psychiatric counselling.

Fig. 1: Status of left upper limb after 2 debridements

Fig. 2: PerOperative pic showing well granulated wound and skin grafted

Fig. 3: Post operative status at the end of 3 weeks and 5 weeks

Fig. 4: Left upper limb post operative status at the end of 2 months

Discussion

Synthetic pyrethroids are being used widely all over the world in agriculture to control numerous pests due to their high insecticidal activity, low toxicity in mammals and almost nil biosphere residue.[5] Of all the available pyrethroids, deltamethrin is the most potent; others include fenvalerate, and cypermethrin.

Poisoning from exposure to pyrethroids, accidental or deliberate is rare. However, several instances have been recorded with pyrethroids causing upper airway and skin irritation along with hypersensitivity reactions. Most of the cases reported are due to accidental occupational exposure due to inadvertent use sans proper precautions and personnel protection. Also longer exposure duration causing poisoning has been reported. Clinical features on exposure include burning and tingling sensation, numbness, increased lacrimation, conjunctival congestion, and bronchospasm. These features usually resolve with supportive symptomatic treatment within 5–6 days and do not call for any specific treatment. Poisoning through enteral route causes abdomen pain, nausea, vomiting, headache and fatigue along with parasthesia, and fasciculations.[6] Convulsions are known to occur with consumption of these compounds in excess of 500 mg.

Pyrethroid poisoning cases are to be managed symptomatically with supportive care and no specific antidote exists. Atropine is given in acute cases or in cases with large dose administration to decrease secretions in excess salivation and pulmonary edema. In cases of oral ingestion, gastric lavage should be given. Cases have been reported in medical literature where the patients with pyrethroid poisoning were treated as organophosphate poisoning due to unavailable history or due to presenting similar clinical features such as fasciculations, pulmonary edema, convulsions.[7,8] Also both these compounds share similar smell because of alike hydrocarbon solvents used. One of the key features to differentiate is that there is no inhibition of plasma cholinesterase in pyrethroid poisoning unlike in organophosphate poisoning and carry a better prognosis even in seriously affected patients.

Immediate application of fasciotomy and surgical debridement should be established to prevent later complications, including compartment syndrome, ischemic contracture or limb amputations, which have been shown to occur in a previous case report of subcutaneous injection of organophosphate.[9] In the present case, a prolonged course of treatment was required since fasciotomy and surgical debridement were not performed immediately. Therefore, immediate fasciotomy and surgical debridement are indicated to be necessary. Furthermore, surgical debridement may also aid in the clearance of toxic substances and contribute to the prevention of possible systemic toxicity.

Medical literature has a very few reported cases of parenteral poisoning and no study regarding this including retrospective or meta-analysis have been made. Goldberg *et al*. reported two patients who attempted suicide by injecting themselves with commercially available household spray insecticides and presented with cellulitis and subsequent abscesses.[10] Sundarka *et al*. reported an 18-year-old woman patient who injected herself OP insecticide with no systemic features but only cellulitis in the distal region of her arm, at injection site.[11]

For prevention of suicidal poisoning from pesticides awareness among communities regarding safer use and storage to prevent accidental exposures along with restriction of availability to prevent suicidal and homicidal incidences have to be done.

Conclusion

This case report of pyrethroid poisoning through parenteral route differs from other reports of parenteral poisoning in that the latter cases were due to organophosphates. No case of parenteral pyrethroid poisoning is available in medical literature. Also unlike in organophosphate poisoning, in our case devastating local toxicity was more than the systemic effects. However it couldn't be determined whether the destructive effect was due to large quantity of pesticide injected, inherent toxicity of the insecticide or due to the fact that patient presented late to us. Hence in the absence of systemic effects of insecticide/pesticide parenteral poisoning clinicians must be aware of possible complications of and be able to differentiate from other conditions such as insect or reptile bites, especially when history is masqueraded.

Key messages: In the absence of systemic effects of insecticide/pesticide parenteral poisoning clinicians must be aware of possible complications of and be able to differentiate from other conditions such as insect or reptile bites, especially when history is masqueraded.

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