Organophosphate Induced Delayed Neuropathy: A Case Report

Bhawesh Thapa*,Manoj K. Sah**,Rewati R. Malla***, Uprety AB.****

*Clinical tutor, **Associate Professor, ***Professor, ****Clinical tutor Department of Medicine, NAMS.

ABSTRACT

Organophosphate-induced delayed neuropathy (OPIDN) is an uncommon toxicity usually occurring in 1-3 weeks following exposure to certain organophosphorus (OP) compounds. It is characterized by distal symmetric sensory-motor polyneuropathy (weakness, paraesthesia, ataxia, diminished or absent reflexes). We describe a 22 years-old female patient who developed cholinergic crisis after initial exposure and later developed paraesthesia associated with lower limbs paresis six weeks after she had ingested a Chlorpyriphos-based insecticide. Nerve conduction Study demonstrated an axonal polyneuropathy pattern.

KEY WORDS: Organophosphorous poisoning, Organophosphate induced delayed neuropathy (OPIDN)

INTRODUCTION

Organophosphorous poisoning is the most common poisoning in an agriculture based country like Nepal, where the easy availability of several organophosphorous based insecticides account for its rampant misuse. In Nepal organophosphorous (OP) compounds account for half(52%) of hospital admissions due to poisoning.[1]Organophosphates are carbon and phosphate containing compounds that are potent inhibitors of the enzyme acetylcholinesterase which normally degrades acetylcholine.

This results in an excess of acetylcholine which can trigger cholinergic toxicity (bradycardia, miosis, lacrimation, salivation, bronchospasm, urination, emesis, diarrhea).[2] Following organophosphate poisoning, 3 well defined neurological syndromes are recognized. These are cholinergic crisis, intermediate syndrome and delayed polyneuropathy.

Correspondence :
Dr. Bhawesh Thapa
Department of Internal Medicine
National Academy of Medical Sciences
Bir Hospital, Kathamdu
Email: bhawesh2000.bt@gmail.com
Contact No: 9852053422

Some organophosphates, particularly triorthocresyl phosphate (TOCP) and tricresyl phosphate(TCP), produce what is called delayed neuropathy .Organophosphate-induced delayed neuropathy (OPIDN) is an axonal polyneuropathy that is characterized by distal weakness and sensory loss, which may be progressive and severe. OPIDN typically occurs one to three weeks after ingestion of one of a small number of specific organophosphorus agents, including chlorpyrifos.[3] However rare cases of OPIDN occurring 6 weeks after ingestion of chlorpyriphos has been described.[4] Here we describe a case of a 22 years female who presented to us in cholinergic excess following suicidal attempt due to chlorpyriphos who was managed successfully and discharged in 2 weeks to return later with progressive lower limb weakness and paresthesias at 6 weeks after initial exposure.

CASE REPORT

A 22 year old previously healthy female consumed a large amount of organophosphorous insecticide (Chlorpyriphos 200 ml) with a suicidal intent presented to a teaching hospital in kathmandu in cholinergic crisis and was managed vigorously by gastric lavage, inj Atropine, and and inj pralidoxime. She was atropinized with a total of 40 ml atropine and was referred to our hospital for ICU care.At presentation to our ER she

was still having features of cholinergic excess and was further given atropine bolus doses . She was admitted and was managed with inj atropine., inj PAM and other symptomatic measures. She did not require ventilation and over the next two weeks made an uneventful recovery and was discharged without any neurological deficits. However, after remaining aymptomatic for 4 weeks, she started having tingling sensation in her feet. Two days after this the patient complained of weakness in right lower limb and she started having difficulty in walking. Gradually she also developed weakness of left lower limb in subsequent two to three days to the extent that she could not walk without support.Tingling and numbness which was her initial complaint resolved during this period but weakness in both lower limbs progressed to the extent that she couldnot stand on her own.

There was no history of fever, back ache, joint pain, and swelling of joints prior to this event. There was no history of root pain, girdle like sensation or bowel and bladder involvement. On neurological examination the patient had normal higher mental function and cranial nerves functions were intact. Power in the upper limbs was normal. Her lower limb examination showed bilateral foot drop with a power of 1/5 at the ankle,1/5 at the metatarsophalangeal joints and 2/5at the knee jonts bilaterally. The patellar reflexes were present and symmetric, ankle reflex was diminished bilaterally while tone was reduced on the lower extremity and plantars were bilaterally mute. All modalities of sensory examinations were normal.

On investigations white blood cell count was 4300/dl, Hemoglobin 11g/dl, Platelet count 277,000/dl, Erythrocyte Sedimentation rate 12/hr and Random Blood Sugar 108 mg/dl. Serum Transaminases, Alkaline Phosphates, renal function tests, vitamin B12 level and Serum Electrolytes were in normal range. Her serology for HBV, HCV and HIV was also negative. Futhermore, chest X-ray and ECG were normal. CSF analysis was normal (glucose 52mg/dl, protein 57 mg/dl, WBC 0 cells/hpf) .X-ray spine did not show any evidence of compression. MRI spine was normal. Nerve conduction study (NCT) showed moderately delayed distal motor latency with markedly decreased amplitudes and motor conduction velocities of bilateral peroneal and tibial nerves. These findings were consistent with motor polyneuropathies of bilateral Peroneal and Tibial nerves(predominantly axonal).NCT in upper limbs and Sensory Nerve studies were within normal range.

DISCUSSION

Organophosphates are a large group of compounds which exerts its toxicity due to inhibition of the enzymes cholinesterase, acetylcholinesterase and neuropathy target esterase. The organophosphorous compounds are rampantly used as insecticides, pesticides, industrial plasticizers and petroleum additives. Due to their ready availability and easy accessibility, they have been frequently used as suicidal agents in Nepal. Three different type of neurological presentations have been recognized following OP poisoning.

Type I paralysis or cholinergic crisis occurs due to excessive stimulation of muscarinic receptors by Ach due to blockade of acetylcholinesterase by an OP agent.

Type II paralysis or intermediate syndrome appears 24 to 96 hours after poisoning which is characterized by muscular weakness affecting predominantly the proximal muscles and neck flexors. This is caused by the dysfunction of the neuromuscular junction caused by the down regulation of presynaptic and postsynaptic nicotinic receptors due to the release of excessive Acetylcholine and Calcium.[5]

Third is the Type III or Organophosphorous induced delayed neuropathy (OPIDN) which usually develops two to three weeks after the initial symptoms. It is characterized by a distal motor axonal neuropathy with minimal or no sensory loss. The earliest symptoms to be seen are paraesthesia and calf pain. Weakness initially develops in the distal leg muscles causing foot drop, later it may extend proximally. Cranial nerve and autonomic involvement are absent. The pathogenesis of OPIDN is presumed to be due to phosphorylation and ageing of an enzyme in axons called neurotoxic esterase or neuropathic target esterase (NTE). Inhibition of NTE causes degeneration

of predominantly long axons, with loss of myelin and macrophage accumulation in nerves leading to motor axonal neuropathy.[6]

We reported here a patient who developed dual neurotoxicity i.e acute cholinergic syndrome(bradycardia,miosis,lacrimation,salivation,bronchospasm,urination,emesis,diarrhea) after consumption of organophosphate compound and suffered from delayed neuropathy. A nerve conduction study revealed distal motor axonal polyneuropathy. The characteristic clinical and electrophysiological features supported the diagnosis of OPIDN. Few cases have been described which document dual neurotoxicity following OP poisoning. Kataria v et al describe a 18 years female who developed acute cholinergic crisis following initial exposure with subsequent development of OPIDN at 2 months.[7] Similarly Thivakaran et al describes a 15 years female who presented in cholinergic crisis after chlorpyriphos ingestion who developed OPIDN at 6 weeks.[8] Rarely all three neurological presentations of OP poisoning can develop in the same patient. Khosya S et al describes such a case of Malathion poisoning where the patient developed cholinergic crisis, intermediate syndrome and OPIDN.[9]

CONCLUSION

OPIDN is an uncommon cause of polyneuropathy. Therefore, during investigation of the causes of peripheral neuropathy it is important to review the history of exposure to organophosphates and should be considered in the differential diagnosis of paraparesis. Similarly OPIDN though usually occurring few weeks after exposure can have a delayed presentation as well. Hence regular follow up of patients of organophosphorous poisoning is important for detection of organophosphate induced delayed polyneuropathy.

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