J Turk Soc Intensive Care 2017;15:85-7
DOI: 10.4274/tybdd.65265

CASE REPORT / *OLGU SUNUMU*

Hüseyin Ulaş Pınar,
Rafi Doğan,
Mine Konuk,
Aylin Şener,
Ömer Karaca

Acetamiprid Poisoning Followed By Prolonged Muscle Weakness

Uzamış Kas Güçsüzlüğü ile Seyreden Acetamiprid Zehirlenmesi

Received/Geliş Tarihi : 03.11.2015
Accepted/Kabul Tarihi : 08.02.2016

Hüseyin Ulaş Pınar, Rafi Doğan, Mine Konuk, Ömer Karaca
Başkent University Konya Training and Research Center, Clinic of Anesthesiology and Reanimation, Konya, Turkey

Aylin Şener
Nevşehir State Hospital, Clinic of Anesthesiology and Reanimation, Nevşehir, Turkey

Hüseyin Ulaş Pınar (✉),
Başkent University Konya Training and Research Center, Clinic of Anesthesiology and Reanimation, Konya, Turkey

E-mail : huseyinpinar2002@yahoo.com
Phone : +90 332 257 06 06
ORCID ID: orcid.org/0000-0003-0473-6763

ABSTRACT Neonicotinoids, a new insecticide group, are considered to possess a low toxicity profile for humans. In this paper, a 41-year-old female patient who was treated for prolonged muscle weakness at an intensive care unit for 22 days and discharged without any sequela following oral acetamiprid intake for suicidal purposes is reported. After developing a clinical picture similar to the intermediate syndrome seen in organophosphate poisoning, the patient recovered with the help of symptomatic and supportive treatment.
Keywords: Poisoning, suicide, muscle weakness

ÖZ Yeni bir insektisid grubu olan neonikotinoidler insanlar için düşük toksisiteli olarak kabul edilmektedir. Bu sunumda 41 yaşında intihar amaçlı acetamiprid oral alımı sonrası uzun süreli kas güçsüzlüğü nedeniyle yoğun bakım şartlarında takip edilmiş ve 22 gün izlem sonrası sorunsuz taburcu edilmiş bir kadın hasta bildirilmiştir. Organofosfat zehirlenmelerinde intermediate sendrom benzeri tablo görülen hasta semptomatik ve destekleyici tedavi ile iyileşmiştir.
Anahtar Kelimeler: Zehirlenme, intihar, kas güçsüzlüğü

Introduction

Neonicotinoids is a relatively novel group of insecticides. This group of insecticides acts by exerting an agonistic effect on postsynaptic nicotinic receptors and are considered to have a low toxicity profile for humans. Nevertheless, with the recent increase in their use, reports of poisonings with these agents have dramatically increased and even some fatalities have been reported (1).

The neonicotinoid group of insecticides has 7 members: acetamiprid, clothianidin, dinotefuran, imidacloprid, nitenpyram, thiacloprid, and thiamethoxam. Among these, acetamiprid has increasingly been used in large scale against sucking insects. In rats, its median lethal dose after oral intake is 140-417 mg/kg. Although there are many reports of poisonings with imidacloprid, our search revealed no reports of poisoning with acetamiprid in the English literature, except for a report of 2 cases (2). Therefore, the clinical outcomes of acetamiprid poisoning after acute oral intake are yet to be clearly defined.

Case Report

A 41-year-old woman with a history of epilepsy but no seizure episodes on valproic acid for the last 5 years was admitted to hospital after suicidal oral intake of 40 g (2 table spoons) Goldplan SP (Agrobest-Turkey), an insecticide in the effervescent form containing 20% acetamiprid. On admission, she was conscious with full cooperation and orientation; her pupils were 4 mm in diameter and isochoric, and light reflexes were bilateral intact. However, she had nausea, vomiting, and abdominal pain, and she

was tachycardic and hypertensive. She was admitted to the intensive care unit. Her admission and follow-up vital signs, arterial blood gas analyses, and laboratory tests were listed on Table 1. At 32nd hour of intensive care unit admission she developed altered consciousness, aphasia, and muscle weakness characterized by complete loss of movement, particularly affecting proximal muscle groups of upper and lower extremities. Considering that she may have sustained an acute intracranial pathology, she was examined with a cranial brain tomography, magnetic resonance imaging (MRI) and diffusion MRI examinations, but no pathology was revealed by these examinations. Her spontaneous respiration was sufficient under supplemental oxygen therapy at 2 L/min. A repeat brain MRI examination on 5th day of admission showed subtle hyperintensities in bilateral superior frontal gyri, subcortical white matter, and periventricular white matter. An electroencephalogram revealed an epileptic activity of focal origin due to focal sharp and slow wave activities concentrated in the right parietal region, which were compatible with her past history of epilepsy. A cerebrospinal fluid (CSF) sample culture ruled out meningitis. The patient's muscle weakness persisted in all extremities and neck muscles, and she was communicated only by eye movements. Bedside physiotherapy was started. She began oral intake on 9th day of admission, had significant improvement in verbal responses by 10th day, began unassisted walking on 17th day, and was discharged without any sequela on 22nd day. At regular telephone follow-ups she was mentally and physically healthy.

Discussion

Neonicotinoids lead to the death of insects by causing neuromuscular paralysis as a result of excessive depolarization due to their potent agonistic effects particularly on the $\alpha 2\beta 4$ subunits of nicotinic acetylcholine receptors. Their affinity for nicotinic receptors is low in mammals and they hardly pass blood brain barrier (3). Still, depending on the amount taken, they can lead to nausea, vomiting, abdominal pain, tachycardia, respiratory failure, aspiration pneumonia, agitation, confusion, coma, muscle weakness in humans. They are associated with lower mortality (2.9%) than other insecticides, namely organophophates (12.3%), carbamates (7.3%), pyrethrins and pyrethroids (3.1%) (4). Severe side

Table 1. Clinical data on hospital stay

	1st day	3rd day	5th day	10th day	15th day	22nd day
Blood pressure (mmHg)	146/95	135/85	124/68	128/85	112/67	112/65
Pulse rate (per min)	82	89	74	92	94	78
SpO_2 (%)	98	97	98	96	95	96
Temperature (°C)	36.2	35.8	36.1	36.4	36.4	35.9
Ph	7.66	7.44	7.43	7.47	7.48	-
$PaCO_2$ (mmHg)	11	36.7	36.4	36.8	28.3	-
PaO_2 (mmHg)	125	104	168	91.1	81.1	-
BE (mmol/L)	-5.3	+0.7	+0.1	3.2	-1.7	-
HCO_3 (mmol/L)	20.1	24.2	23.8	26.7	21.2	-
Na (mmol/L)	135	137	136	139	144	134
K (mmol/L)	4	3.68	3.5	3.7	4.1	3.6
Cl (mmol/L)	111	108	105	109	109	101
BUN (mg/dL)	29	14	12	16	24	14
Creatinine (mg/dL)	0.68	0.63	0.55	0.56	0.75	0.56
AST (U/L)	27	16	16	25	63	34
ALT (U/L)	16	10	20	56	101	161
CK (U/L)	78	65	-	-	61	-
Hb (g/dL)	14.4	12.3	12.2	12.6	12.5	12.2
Leukocyte (per mm^3)	8800	7300	5200	11700	8400	4300

BUN: Blood urea nitrogen, AST: Aspartate aminotransferase, ALT: Alanine aminotransferase, CK: Creatine kinase, Hb: Hemoglobin

effects and death occurs after suicidal or accidental oral intake rather than inhalation or dermal exposure (2).

Muscle weakness has been frequently reported in poisonings with acetamiprid and other neonicotinoids. However, apart from fatal cases in which severe respiratory failure accompanies clinical picture, muscle weakness has generally been reported to recover within hours. An interesting point in our case was muscle weakness particularly affecting proximal muscle groups, which we also held responsible for aphasia in our patient, that was absent on presentation but developed 32 hours after intensive care unit admission. This clinical presentation calls into mind the intermediate syndrome frequently encountered in organophosphate poisonings. As is well known, the intermediate syndrome is a clinical condition that develops within 24-96 hours after organophosphate intake in 20% of victims. Its characteristic signs include cranial nerve involvement, respiratory failure, weakness and loss of deep tendon reflexes in neck and proximal extremity muscles. Possible mechanisms include prolonged acetylcholinesterase inhibition, downregulation or desensitization of acetylcholine receptors, muscle necrosis, oxidative injury-associated myopathy, and inadequate oxime treatment. Complete recovery can be achieved with appropriate treatment including respiratory support within 5 to 18 days (5,6).

Also in the present case the time of onset and duration of symptoms suggest the intermediate syndrome. However, no such a presentation has ever been reported with neonicotinoid poisoning. It is difficult to predict what caused the clinical presentation of the patient that we are familiar with organophosphate poisonings. It can be assumed that the above mentioned mechanisms are also valid for this patient.

The treatment of acute poisoning with neonicotinoids consists of symptomatic and supportive treatment. Respiratory support was not necessary in this patient. Early physiotherapy was started during the period of muscle weakness, and nutritional support was provided via parenteral route to avoid the risk of aspiration pneumonia. On the other hand, the outcomes with medications like atropine and oximes are unclear in the setting of neonicotinoid poisoning (1).

In conclusion, symptomatic and supportive treatment sufficed in the management of an intermediate syndrome-like clinical presentation encountered for the first time in a setting of neonicotinoid insecticide poisoning. Large case series or animal studies may be needed to study the role of oxime group of medications to prevent the development of an intermediate syndrome-like clinical course.

Ethics

Informed Consent: It was taken.

Peer-review: External and Internal peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: H.U.P., R.D., Concept: H.U.P., R.D., Design: H.U.P., Ö.K., Data Collection or Processing: H.U.P., M.K., A.Ş., Analysis or Interpretation: H.U.P., Literature Search: H.U.P., R.D., Writing: H.U.P., R.D., M.K., A.Ş., Ö.K.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

References

1. Phua DH, Lin CC, Wu M, Deng J, Yang C. Neonicotinoid insectisides: an emerging cause of acute pesticide poisoning. Clin Toxicol (Phila) 2009;47:336-41.
2. Imamura T, Yanagawa Y, Nıshıkawa K, Matsumoto N, Sakamoto T. Two cases of acute poisoning with acetamiprid in humans. Clin Toxicol (Phila) 2010;48:851-3.
3. Tomizawa M, Casida JE. Neonicotinoid insectiside toxicology: mechanisms of selective action. Annu Rev Pharmacol Toxicol 2005;45:247-68.
4. Yang CC. Epidemiology of acute pesticide poisoning in Taiwan. 2008 Workshop on Pesticide Poisoning, Taichung, Taiwan, May 31,2008.
5. Abdollahi M, Karami-Mohajeri S. A comprehensive review on experimental and clinical findings in intemediate syndrome caused by organophosphate poisoning. Toxicol Appl Pharmacol 2012;258:309-14.
6. Yang CC. Deng JF. Intermediate Syndrome Following Organophosphate Insectiside Poisoning. J Chin Med Assoc 2007;70:467-72.