

1 CASE REPORT

2 Amitraz Poisoning; A case study

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7 ABSTRACT

8 Amitraz, an insecticide/acaricide of the formamidine pesticides group, is a α_2 adrenergic agonist and of
9 the amidine chemical family generally used to control animal ectoparasites. Poisoning due to amitraz is
10 rare and characterized by central nervous system and respiratory depression, bradycardia, hypotension,
11 hypothermia, hyperglycemia, nausea and vomiting. Few cases of intoxications in human beings due to
12 this pesticide have been published in the literature. However, a clear and specific treatment protocol
13 does not exist and this makes the successful managements of this poisoning (presented in the case
14 reports) a probable useful guide for clinical practitioners in other poison centers. Management of amitraz
15 poisoning is still considered to be supportive and symptomatic. We present a case of amitraz poisoning
16 who successfully managed by supportive treatments in a 20 years old female.

17 **Keywords:** Amitraz; Bradycardia; Miosis; Central nervous system

18 Amitraz, a triazapentadiene compound and a 43 amitraz poisoning who was conservatively managed in
19 member of the amidine chemical family is a 44 intensive care unit (ICU) for 36 hours and experienced a
20 formamidine pesticides used worldwide. It is used as an 45 complete recovery.
21 insecticide/acaricide to control animal ectoparasites [1-
22 23]. Commercial formulations of amitraz generally
23 contain 12.5-20% of the drug in organic solvents, 46
24 especially xylene, which is itself used in paints,
25 cleaners, and glues [4]. Amitraz is a α_2 -adrenergic
26 agonist stimulating α_2 adrenergic receptors in the central
27 nervous system (CNS) and both α_1 and α_2 adrenergic
28 receptors in the periphery. It also inhibits monoamine
29 oxidase (MAO) enzyme activity and prostaglandin E_2
30 synthesis [5].

31 Poisoning occurs through oral, inhalational (the most
32 potential), and dermal routes and is accompanied by
33 numerous signs and symptoms varying from CNS
34 depression (drowsiness, coma, and convulsion), to
35 miosis, or rarely, mydriasis, respiratory depression,
36 bradycardia, hypotension, hypertension, hypothermia or
37 fever, hyperglycemia, polyuria, vomiting, decreased
38 gastrointestinal motility, and intestinal distension [4].
39 Adverse reactions and side effects have been reported in
40 animals exposed to the product; however, only few
41 human intoxication cases have been reported in the
42 literature. We present a young female patient with

46 CASE STUDY

47 A 20-year-old female referred to L.G. Hospital in
48 Ahmedabad, Gujarat, India after the ingestion of 2 to 3
49 full table spoons of amitraz chemical (10% solution) in
50 a suicidal attempt. Her first symptoms had begun about
51 one hour post ingestion and included nausea and
52 dizziness, after which vomiting had ensued. Her family
53 had immediately brought her to our center where
54 gastric lavage with normal saline and administration of
55 activated charcoal (1 g/kg) were performed. She was
56 then admitted to ICU for further management.
57 At presentation, she was drowsy but followed the
58 verbal commands. Her blood pressure, pulse rate,
59 respiratory rate, and temperature were 126/80 mmHg,
60 90 bpm, 24/min, and 36.8°C, respectively. Analysis
61 of blood gases showed PaO₂ of 106.4, O₂ saturation
62 of 96%, pH of 7.40, PCO₂ of 34.0, and HCO₃⁻ of 21.6.
63 Other lab tests were as follow: blood urea nitrogen: 13
64 mg/dL; creatinine: 0.80 mg/dL; sodium: 138.9 mEq/L;

65 potassium: 4.48 mEq/L; alanine transaminase: 15.7120bradycardia by stimulating the dorsal motor nucleus of
 66 IU/I; blood glucose: 95 mg/dL (normal range, 70 to 110121the vagal nerve. It has been claimed that atropine
 67 mg/dL); PT: 14.7; INR: 1.03; calcium: 9.33 mg/dL; and122increases heart rate and prevents amitraz-induced
 68 magnesium: 2.2 mg/dL. In complete blood count,123bradycardia in animals [2]. We administered atropine to
 69 hemoglobin, white blood cells, and red blood cell count124our patient only once with adult dose. We believe
 70 were reported to be 6.72 g/dL, 8260/mm³, and125atropine is effective in amitraz poisoning only when
 71 4.58×10⁶/mm³, respectively. Chest X-Ray was normal.126bradycardia exists.
 72 One unit of packed cell was injected due to the low127 Although it has been declared that amitraz and its
 73 hemoglobin level. No special treatment was performed128active metabolite inhibit insulin and stimulate glucagon
 74 except for gastric decontamination and cardiac and129secretion, we did not detect hyperglycemia in our case.
 75 respiratory monitoring. Atropine (once; 4mg stat) was130This is in contrast with the previous study by Demirel
 76 also administered for the treatment of the patient's131and colleagues that reported hyperglycemia in nearly
 77 transient bradycardia. During the ICU stay, the patient13264% of the cases [7]. Avsarogullari et al reported
 78 developed premature ventricular contractions (PVCs)133hyperglycemia and fast deterioration of the patients
 79 which were treated by administration of one dose of134(within 5 minutes after the ingestion of the toxin) that
 80 lidocaine (1.5 mg/kg) and resolved in 24 hours. By the135were both absent in our case [8]. Elevations of the
 81 following day, she was completely conscious and was136aspartate transaminase was also detected in almost 20%
 82 able to answer to the questions. She completely137of their patients which was not detected in our case.
 83 recovered and was discharged from the hospital in138 Usually, levels of BUN, creatinine, and the serum
 84 the afternoon of the second day of admission. 139sodium and potassium do not change in this poisoning

85

DISCUSSION

86 Formamidines have been shown to have reversible145associates have reported respiratory alkalosis in two,
 87 toxic effects on both animals and human beings [4].146respiratory acidosis in three, and metabolic acidosis in
 88 Since there are few reported human intoxications by this147five cases [9].
 89 pesticide, the existing information about it is frequently148 We observed PVCs in our patient's
 90 built on animal studies. The median lethal dose in its149electrocardiogram (ECG) which recovered after 24
 91 acute oral toxicity (LD₅₀) for the rats is 800 mg/kg [3,4].150hours. In contrast, in a study by Aydin and coworkers,
 92 The clinical signs and symptoms of this poisoning151non-specific ST changes were detected in the ECGs of
 93 reported in previous reports include CNS depression,152seven children with no history of cardiac disease who
 94 drowsiness, vomiting, miosis, bradycardia, hypotension,153completely resolved in 24 h and PVCs were not
 95 and hyperglycemia. The duration of CNS depression has154detected [10].
 96 ranged from a few hours to 24 h [4]. CNS symptoms155 Our case is interestingly very similar to a 54-year-
 97 began within 30-150 minutes and resolved within 6-20 h156old patient who had referred to Elinav and associates
 98 in our case. Sedative effects of α 2-agonists are dose-157(with a clonidine-like syndrome) and managed in the
 99 dependent [1]. Coma, absence of light reflex, and158same way [11]. Although not related to our patient, It is
 100 respiratory failure are due to the ingestion of greater159interesting to know that intravenous administration of
 101 amounts of amitraz supporting its dose-dependent160amitraz can result in respiratory depression,
 102 effects. Our patient was fully conscious after 24 h. This161hypotension, bradycardia, hematuria, and edema and
 103 time has been reported to be 2-48 h in previous reports. 162hyperemia at the injection site which again are benign
 104 The effect of amitraz on α ₁- and α ₂-receptors causes163and resolve without complications [12].
 105 bradycardia [5]. In addition, literature reported164 In conclusion, basic approach to a patient with
 106 hyperglycemia, hypotension, and bradycardia in amitraz165amitraz poisoning consists initial stabilization, reducing
 107 poisoning and attributed them to the alpha-2166absorption, and increasing elimination of the toxin.
 108 adrenoceptor agonist action of amitraz [6]. In our case,167Medical management is essentially symptomatic and
 109 bradycardia was also present accompanying with miosis168supportive. No specific antidote exists [2].
 110 which developed during the course of hospitalization.169 Although activated charcoal and cathartic effects
 111 Co-existence of bradycardia, miosis, and the respiratory170have not been evaluated, they are still considered in the
 112 depression leads to confusion with organophosphate or171treatment protocol of these patients. Attention must be
 113 opioid poisonings, both of which should be excluded. 172paid to the evaluation of the respiratory, cardiac, and
 114 Using atropine for treatment of bradycardia is173central nervous systems. Increased intake may lead to
 115 controversial. Most studies, however, have reported174severe effects including coma and respiratory failure.
 116 atropine to resolve both miosis and bradycardia.175With supportive management, prognosis is good and
 117 Atropine is the first line therapy for the bradycardia176the patients are discharged without any organ
 118 resulted from vagal stimulation and atrioventricular177dysfunction. This is similar to the results of Demirel et
 119 blocks. Alpha-2 adrenergic drugs can also cause

178al [7] and Avsarogullari et al [8] who reported a good
179prognosis in amitraz intoxications.

180 REFERENCES

1811. Queiroz-Neto A, Zamur G, Gonçaves SC, Carregaro AB, 210
182 Mataqueiro MI, Harkins JD, Tobin T. Characterization of the 211
183 antinociceptive and sedative effect of amitraz in horses. *J Vet* 212
184 *Pharmacol Ther* 1998; 21:400-5. 213
1852. Agin H, Calkavur S, Uzun H, Bak M. Amitraz poisoning: 214
186 clinical and laboratory findings. *Indian Pediatr* 2004; 41:482-6. 215
1873. Eizadi-Mood N, Sabzghabae AM, Gheshlaghi F, 216
188 Yaraghi A. Amitraz Poisoning Treatment: Still Supportive? 217
189 *Iran J Pharmaceut Res* 2011; 10:155-8. 218
1904. Shitole DG, Kulkarni RS, Sathe SS, Rahate PR. Amitraz 219
191 poisoning-an unusual pesticide poisoning. *J Assoc Physicians* 220
192 *India* 2010; 58:317-9. 221
1935. 5. Jorens PG, Zandijk E, Belmans L, Schepens PJ, Bossaert LL. 222
194 An unusual poisoning with the unusual pesticide amitraz. *Hum* 223
195 *Exp Toxicol* 1997; 16:600-1. 224
1966. Jones RD. Xylene/amitraz: a pharmacologic review and profile. 225
197 *Vet Hum Toxicol* 1990; 32:446-8. 226
1987. Demirel Y, Yilmaz A, Gursoy S, Kaygusuz K, Mimaroglu C. 227
199 Acute amitraz intoxication: retrospective analysis of 45 cases. 228
200 *Hum Exp Toxicol* 2006; 25:613-7. 229
2018. Avsarogullari L, Ikizceli I, Sungur M, Sözüer E, Akdur O, Yücei 230
202 M. Acute amitraz poisoning in adults: clinical features, 231
203 laboratory findings, and management. *Clin Toxicol (Phila)* 2006; 232
204 44:19-23. 233

Kalyoncu M, Dilber E, Okten A. Amitraz intoxication in
children in the rural Black Sea region: analysis of forty-three
patients. *Hum Exp Toxicol* 2002; 21:269-72.

Aydin K, Kurtoğlu S, Poyrazoğlu MH, Uzüm K, Ustünbaş HB,
Hallaç IK. Amitraz poisoning in children: clinical and laboratory
findings of eight cases. *Hum Exp Toxicol* 1997; 16:680-2.

Elinav E, Shapira Y, Ofra Y, Hassin T, Ben-Dov IZ. Near-fatal
amitraz intoxication: the overlooked pesticide. *Basic Clin*
Pharmacol Toxicol 2005; 97:185-7.

Gursoy S, Kunt N, Kaygusuz K, Kafali H. Intravenous amitraz
poisoning. *Clin Toxicol (Phila)* 2005; 43:113-6.

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