

71. ROLE OF CHOLINESTERASE ACTIVITY IN THE TREATMENT OF ORGANOPHOSPHATE INTOXICATION

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INTRODUCTION

Organophosphate insecticides (OP), one of the anticholinesterase agents, are more toxic and have been responsible for more human deaths than other pesticides. We treated 160 seriously acute intoxicated patients exposed to OP, between 1991 and 1999 in the intensive care unit. 12 patients (7,5 %) died due to complications of ARDS and sepsis.

Namba Classification and serum cholinesterase activity (sChE) are taken into consideration for the diagnosis and management of the treatment.

PATIENTS AND METHODS

We introduce two female patients (ages 18 and 47) exposed to severe OP (Namba IV) poisoning. Each patient was followed daily, according to Namba Classification and sChE activity, as determined with Ellman's spectrophotometric method (range 40-80 U/mL).

Case A: K.T., 18 year old female: 25 % Chlorpyrifos solution ingestion for suicidal purpose

She had Namba Grade IV and sChE was 16,1 U/mL.

After initial doses of atropine and pralidoxime, 4 mg. atropine/day and 1 gr 2-PAM/day were infused for eleven days and stopped. sChE levels increased on the seventh day (27 U/mL), but the day after suddenly decreased (3 U/mL). Improvement of the sChE and with that, her Namba grade, was observed on later days. She was discharged on the fifteenth day with an sChE level of 18,2 U/mL and Namba grade I. Seven days afterwards, in a control examination, her sChE was found to be 31,5 U/mL. This is shown in Figure 1.

Case B: E.G, 47 year old female: Unkown OP insecticide ingestion for suicidal purpose

She had Namba Grade IV and sChE was 26,6 U/mL.

After initial doses of boluses atropine and 2-PAM, 1mg Atropine infusion/day was started and this dose was gradually increased up to 24 mg on the ninth day. In addition, 2 g 2-PAM were also infused during these days. Both of the drugs were ceased on the ninth day, due to improvement of her grade and enzyme level (Namba Grade II, sChE 40 U/mL.). However, she deteriorated clinically and the sChE decreased to 10 U/mL on the fourteenth day. We started 0,5 mg Atropine/day and 0,5 gr 2-PAM/day infusion again and continued until 28th day after admission. Patient was discharged with Namba Grade I and 32,2 U/mL. Ten days later, when she came in for a control exam, her sChE level was 35 U/mL. This is shown in Figure 2.

NAMBA CLASSIFICATION (1)

This clinical classification is explained below.

LATENT POISONING: Namba I

No clinical manifestation, sChE inhibited 10-50 %.

Treatment unnecessary, prognosis good.

MILD POISONING: Namba II

Fatigue, headache, nausea and vomiting, abdominal pain, diarrhea, excessive sweating and salivation, sChE inhibited 20-50 %.

Treatment oxime and atropine, Prognosis good.

MODERATE POISONING: Namba III

Generalized weakness, difficulty in speech, muscular fasciculations, miosis, sChE 10-20 % of normal.

Treatment oxime, atropine, mechanical ventilation, prognosis good.

SEVERE POISONING: Namba IV

Unconsciousness, pin-point pupils and loss of light reflex, muscular fasciculations, secretions from the mouth and nose, rales in the lungs, respiratory difficulty, sChE less than 10%

Treatment oxime, atropine, mechanical ventilation, prognosis fatal, if not treated

OP INTOXICATION TREATMENT SCHEDULE

From our experiences, the following treatment schedule is recommended:

INITIAL DOSES

Atropine: 8 mg i.v. bolus

Pralidoxime: 1 g i.v. bolus

MAINTENANCE

Atropine: 1-4 mg infusion/day

Pralidoxime: 0,5-2 g infusion/day

Benzodiazepines for convulsions

EVALUATION

sChE Activity/day

Namba Evaluation/day

ADDITIONAL

Mechanical Ventilation, Enteral or parenteral feeding

DISCUSSION

Atropine and oximes are cornerstones of the treatment for OP poisoning. When given together, they act synergistically against the signs and symptoms. It is a very interesting point that the sChE decreased and the clinical status of each patient deteriorated in the middle of the treatment. This can be related to redistribution of the lipophilic substance or oxon metabolites of Chlorpyrifos, which are 400 times more active as a cholinesterase inhibitor than the parent compound.(2). Recovery took a short time, five days, and was easier when the treatment was continuous as in Case A. However a longer period, fifteen days, was required, when the treatment ceased as in Case B.

CONCLUSION

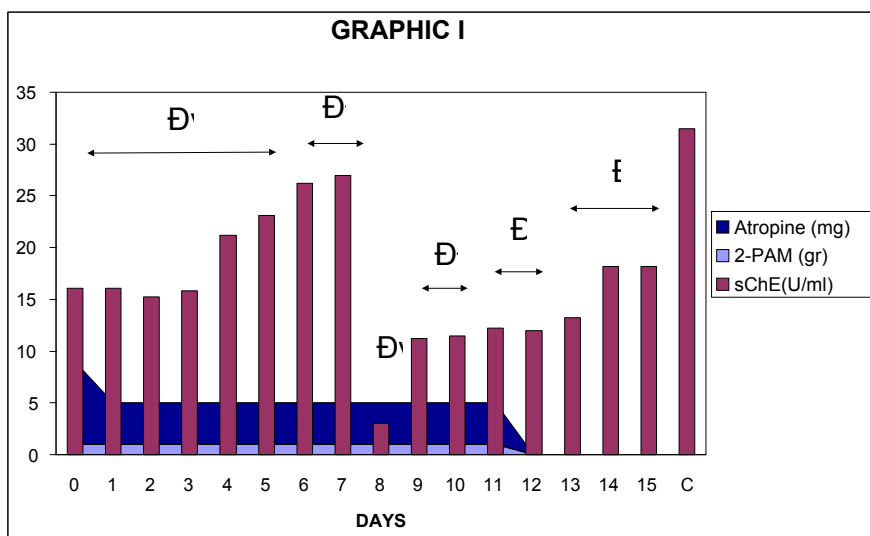
Namba Classification and sChE level are the main criteria for the diagnosis and the severity of OP poisoning.

Treatment can be maintained with their guidance, but the kind of substance and metabolites can change the properties of recovery period. The clinical situation is much more important than the sChE levels in deciding the cessation of antidotal therapy, because it will take at least 4 to 6 weeks to return to normal values of sChE.

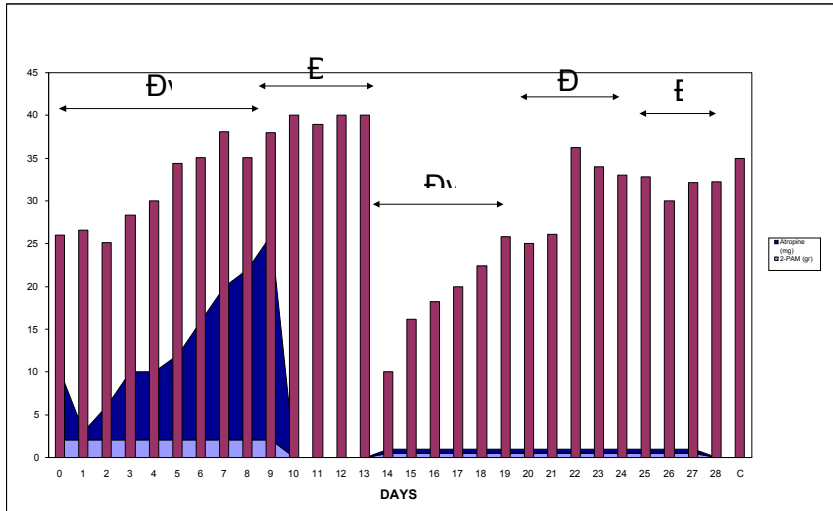
REFERENCES

1. Namba, T., Nolte, C.T., Jackre, J., Grob, D. (1971): Am J Med, 50:475
2. Baselt & Cravey (1989): © 1974-99 Micromedex, Vol. 101

FIGURES AND TABLES



CASE A: K.T., 18 year old female, 25%Chlorpyrophos ingestion



CASE B: E.G, 47 year old female, unknown OP ingestion