ศูนย์พิษวิทยารามาธิบดี
คณะแพทยศาสตร์โรงพยาบาลรามาธิบดี มหาวิทยาลัยมหิดล
อาคารสุโขเพลส ถนนสุโขทัย กรุงเทพมหานคร 10300 สายด่วน 1367 โทรสาร 0-2201-1084

RAMATHIBODIPOISONCENTER
Faculty of Medicine RamathibodiHospital, Mahidol University
Sukho Place Building, Sukhothai Rd., Bangkok 10300 Hotline 1367

Suspected Tricyclic Antidepressant (TCA) Ingestion

พิจารณาเกี่ยวกับศักยภาพในการดูแลผู้ป่วย หากเกินความสามารถควรส่งต่อ หรือสอบถามเพิ่มเติมโทร. 1367

TCA toxicity suspicion
- Anticholinergic effects : dry mouth, dry flushed skin, urinary retention, bowel ileus, tachycardia
- EKG : Sinus tachycardia and prolonged QRS complex or other features of Na channel blockade
- CNS toxicity
  - Altered mental status, delirium, lethargy, coma
  - Seizure
- Cardiovascular toxicity
  - Hypotension
  - Dysrhythmia

✳ Progression of clinical toxicity may be unpredictable and rapid

Immediate life-threatening conditions

Yes → Advanced life support/Resuscitation/ Intubation as indicated

No

- GI decontamination (only when airway is intact or secured)
  - NG lavage (within 1 h after ingestion)
  - Activated charcoal 1g/kg oral (within 4h after ingestion)
- Monitor EKG/serial EKG 12 leads, monitor vital signs
- IV Fluid as indicated
- Lab : BUN/Cr, Electrolyte, Poct-glucose, Blood gas (ABG or VBG)
- Admit

Clinical toxicity (นอกเหนือจาก anticholinergic effects)

Yes → **CNS Toxicity**

Yes → **Alteration of consciousness** → General supportive care

No → **CVS Toxicity**

Yes → **Seizure** → Treatment as in the box D

No → Monitor vital signs and EKG for minimum of 6 h

Asymptomatic after 6 h → Discharge and psychiatric evaluation

No

Delayed conduction
- Wide QRS > 100 ms

→ Treatment as in the box A

Dysrhythmias
- Wide complex tachycardia
- Torsades de pointes

→ Treatment as in the box B

Hypotension → Treatment as in the box C

*The mainstay for treating wide complex dysrhythmias, conduction delays and hypotension is sodium loading and serum alkalinization

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A - Delayed conduction

- Wide QRS > 100 msec

- ☑ Sodium bicarbonate 1-2 mEq/kg IV bolus to reverse the abnormality
- ☑ Repeat sodium bicarbonate 3-5 min to reverse the abnormality
- ☑ Monitor EKG/serial EKG 12 leads
- ☑ Repeat sodium bicarbonate if EKG shows conduction delayed

OR
Consider infusion after bolus

- ☑ Sodium bicarbonate 150 ml in 1 L of 5-D/W 1000 ml infusion at rate 2-3 ml/kg/hr
- ☑ Monitor EKG/serial EKG 12 leads

Goal : keep blood pH 7.5-7.55

* Check K, ionized Ca (alkalinization can decrease in K and ionized Ca)

B - Dysrhythmias

Wide complex tachycardia

- ☑ Sodium bicarbonate 1-2 mEq/kg IV bolus to reverse dysrhythmia
- ☑ Target serum pH 7.5-7.55
- ☑ Correct hypoxia, acidosis, hypotension

OR

- ☑ Hypertonic saline (3%NaCl) 1-3 ml/kg IV over 10 min (if serum alkalinization with sodium bicarbonate is not possible)

If no response

- ☑ Lidocaine 1-1.5 mg/kg IV slowly bolus, followed by infusion of 1-4 mg/min (20-50 mcg/kg/min)

If no response

- ☑ Magnesium sulfate 1-2 g IV (25-50 mg/kg) IV over 2 min

Torsades de pointes

- ☑ Magnesium sulfate 1-2 g IV over 2 min
  or/and
- ☑ Overdrive pacing

C - Hypotension

- ☑ Isotonic saline (0.9% NaCl) up to 30 ml/kg
- ☑ Correct hypoxia, acidosis

If no response

- ☑ Sodium bicarbonate 1-2 mEq/kg IV bolus to target serum pH 7.5-7.55 (if suspected a direct effect of TCA on myocardial depression/acidosis)

If no response

- ☑ Norepinephrine 0.1-0.2 mcg/kg/min IV

If no response

- ☑ Mechanical support with extracorporeal mechanical circulation (cardiopulmonary bypass, ECMO)

D - Seizure

- ☑ Benzodiazepine 5-10 mg (0.1-0.5 mg/kg) IV bolus
- ☑ Secure airway if necessary
- ☑ Correct hypoxia, acidosis

If no response

- ☑ Barbiturate : pentobarbital 5-15 mg/kg, phenobarbital 15-20 mg/kg IV

If no response

- ☑ Continuous infusion of midazolam (0.2 mg/kg IV; maintenance dose of 0.05-2 mg/kg/hr) or propofol (1-2 mg/kg IV; maintenance dose of 30-200 mcg/kg/min)

If no response

- ☑ Neuromuscular paralysis/general anesthesia with EEG monitoring

If clinically improved, monitor vital signs and serial EKG (after the termination of TCA therapy) at least 24 h
Psychiatric evaluation before discharge

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TCA

Pharmacologic Activity	Clinical Presentation
Inhibition of NE reuptake	Agitation, diaphoresis, tachycardia, hypertension
Inhibition of serotonin reuptake	Confusion, mydriasis, myoclonus, hyperreflexia
Antagonism of postsynaptic histamine receptors	Sedation, depressed consciousness
Antagonism of postsynaptic muscarinic receptors	Agitation, confusion, sedation, coma dilated pupils, hypertension, hyperthermia, dry skin, ileus, urinary retention
Antagonism of postsynaptic a-adrenergic receptors	a1-adrenergic receptor : miosis, hypotension, reflex tachycardia a2-adrenergic receptor : mild hypertension
Voltage-gated Na channels blockade	Impaired conduction, wide QRS complex, Brugada pattern, impaired cardiac contractility, hypotension
Voltage-gated K channels blockade	QT interval prolongation, ventricular ectopy, torsades de pointes

- Peak plasma concentration reach 2-6 h at the therapeutic dose but GI absorption can be prolonged in overdose

EKG abnormalities
Sinus tachycardia
Right axis deviation of the terminal 40 msecs (positive R in aVR, negative S in lead I, aVL)
R in aVR >= 3 mm, R/S in aVR > 0.7
Prolongation of PR, QRS and QT intervals
Right bundle branch block
Various degrees of atrioventricular block
Brugada pattern (down-sloping ST segment elevation)
Torsade de pointes
Bradyarrhythmia

*Sodium channel blockade can be overcome by serum alkalinization and increase serum sodium concentration

*Avoid alkalinization if pH > 7.55, it can be deleterious to oxygen extraction

*Hypertonic sodium chloride is associated with hyperchloremic metabolic acidosis

*Hyperventilation is an alternative in patients who can not tolerate large amount of Na (ARDS, CHF)

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