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Intoxication
(CO, paracetamol, toxic alcohols)

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Learning objectives

- Student will learn basic approach to the acutely intoxicated patient

- Student is able to distinguish the sign and symptoms, determine the examination, and initiate correct therapy in patient poisoned by carbon monoxide, paracetamol and toxic alcohols

Lecture content

- Definition, characteristics of poisoning
- Initial evaluation
- Therapeutic approach
- Examples of toxidromes
- Examination
- Carbone monoxide poisoning
- Paracetamol poisoning
- Toxic alcohols poisoning

Definition, characteristics of poisoning

= penetration of the poison to the organism causing severe health disorder

- Accidental vs. intentional
- Effect local vs. general
- Routes of poisoning (alimentary- p.o., inhalation, through the skin, intravenous)
- Time of exposition
- Drugs, chemicals, plants, alcohols, CO, animals…

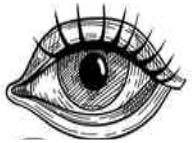
Initial evaluation

- Poisoning recognitionu-disorder of consciousness
- History, time frame, poison identification
- Toxidromes (sedative, cholinergic, sympathomimetic,…)
- Poisoining course prediction, dynamics
- Compensatory mechanisms can affect the clinical findings
- ABCDE
- Associated injuries
- ABG disorders

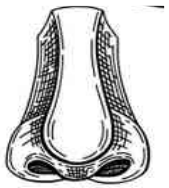
Toxidromes- Anticholinergic

- Atropin
- Antihistamines (prometazin)
-Antiparkinson drugs (biperidin)
- Antiepileptics (carbamazepin)
- Antipsychotics (quetiapine)

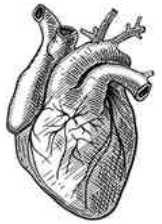
Agitation,myoclonus, hyperpyrexia, convulsions



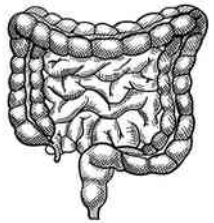
Mydriasis



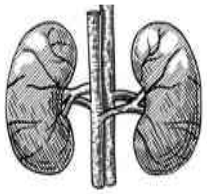
Mucosal and skin dryness, flush



Arrhytmia



GI tract slowdown



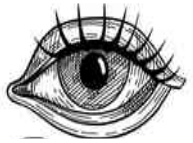
Urine retention

Toxidrome- Hypnotic+ opioid

- Barbiturate
- Ethanol
- Anticonvulsants
- Morphine and its

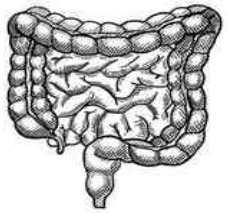
derivates

Ataxia, delirium, paresthesia, dimineshed speech, respiratory center depression

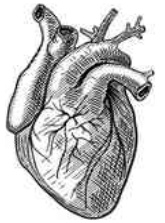


Blurred vision, diplopia

Opioids- miosis



Dissappearence of peristalsis

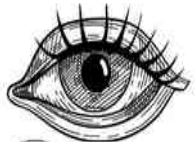


Hypotension, bradycardie

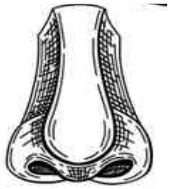
Toxické syndromy - Sympatomimetic

- Cocaine
- Amphetamine
- Efedrin
- Caffeine
- Teophyline

Hallucination, hypereflexia, tremor, convulsions

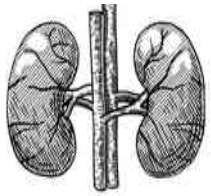


Mydriasis



Hyperpyrexia, perspiration

Hypertension, tachycardia, heart failure



Rhabdomyolysis

Examination

- Labs: Ions, glycemia, lactate, myoglobine,full blood count, liver function test, urea, creatinine
- Acid based balance status
- ECG
- Chest X Ray, head CT scan
- Material collection- urine, blood, stomach content
- Identification the cause of poisoning, determination of toxin levels, toxicological screening sets

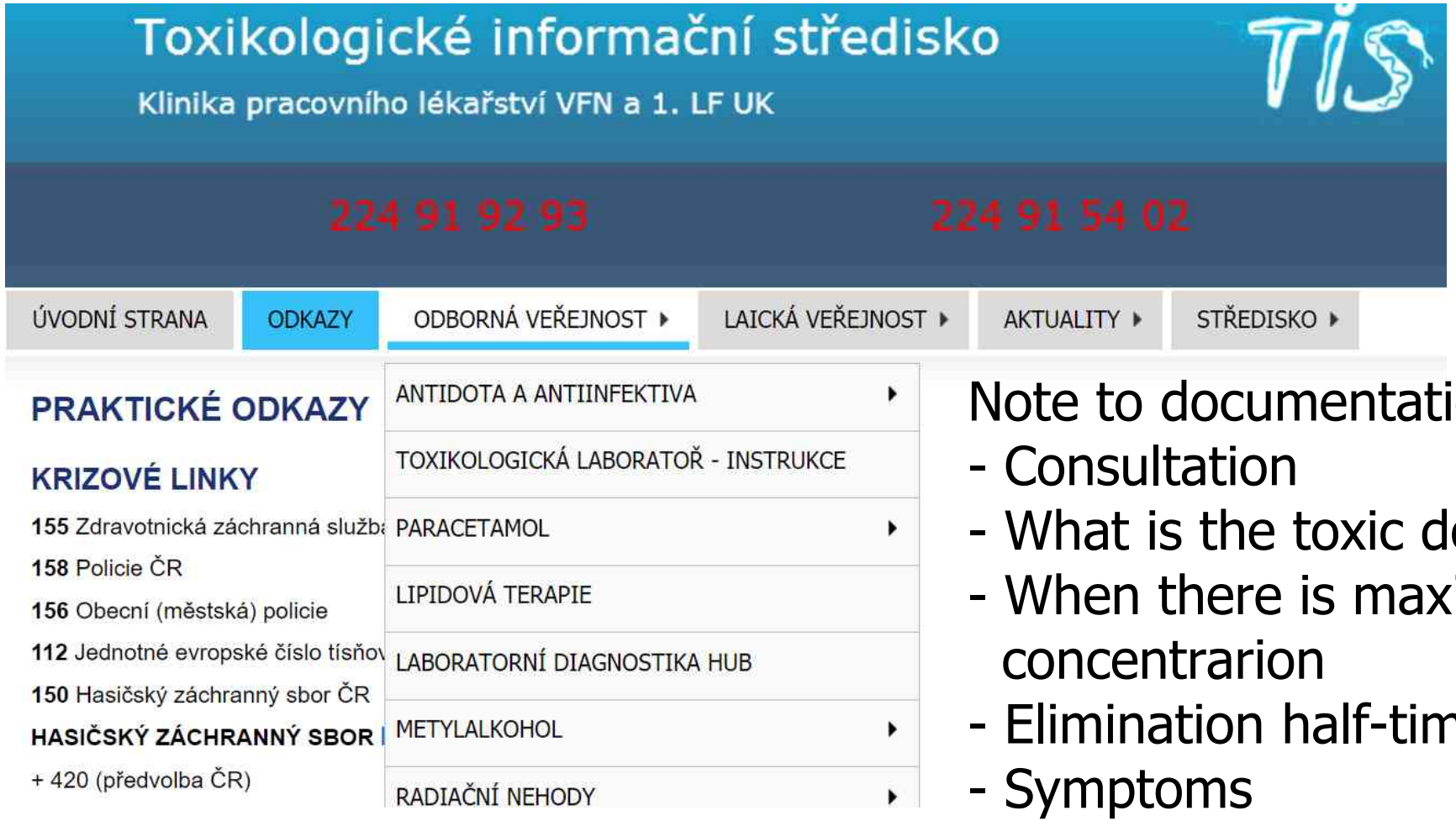
Therapeutic approach

- Prevention of toxin absorption

- **Gastric lavage** (NaCl, amount of fluid, „until it is clean“)
- **Activated carbon** 1g/kg into nasogastric tube
  (DO NOT USE in Li, Fe, alcohols, cyanides,acids, lye intoxication)

- Administration of an antidote
- Increased toxin elimination- hemodialysis, hemoperfusion

Toxicological Information Center-TIS



Note to documentation:
- Consultation
- What is the toxic dose
- When there is maximal plasmatic concentrarion
- Elimination half-time
- Symptoms
- Therapy

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Antidotes

- Paracetamol - N Acetylcystein
- Opiois - Naloxone
- Benzodiazepines - Flumazenil
- Calcium channel blockers- CaCl2
- Beta blockers- Glukacagon
- Methanol, Ethylenglykol - Ethanol
- Anticholinergics - Fyzostigmine
- Organofosfáty – Atropine
- Dixogin-DIGIFab

Carbon monowide poisoning (CO)

- Colorless gas, odorless
- Poorly ventilated rooms, exhaust gases
- Carboxyhemoglobin (shift of Hb dissociation curve to the left)
- Headache, nausea, syncope, convulsions, hypotension, cardiac arrest
- Falsely high 02 levels
- COoxymetry, Astrup, full blood count, toxicology, neurological examination
- **100% fraction O2** (NIV, mechanical ventilation), hyperbaric oxagen therapy
- Late neurological disability

Paracetamol poisoning

- Toxic dose: adults 8-12 g, children 150 mg/kg
- Maximal plasmatic concentration in 4 hours
- Hepatic metabolism cytochromem P450 to NAPQI (hepatotoxic) than conjugation with glutathione
- Symptoms: non specific – nausea, vomitting, after 24h abdominal pain, elevation of transaminases, coagulopathy, hepatic failure

- Therapy: non specific - gastric lavage, activated carbon
  specific- N-acetylcysteine

Paracetamol poisoning

N-acetylcysteine (NAC)

Regenerates glutathione stores, neutralizes NAPQI, potentiates conjugation

Prevents the development of liver failure, if administered in time

Scheme of administration of NAC:

1. 150 mg/kg i.v.
2. 50 mg/kg i.v. infusion for 4 hours
3. 100 mg/kg i.v. to 1000 ml 5% glc infusion 16 hours
4. 100 mg/kg i.v. to 1000 ml 5% glc infusion 16 hours

Toxic alcohol poisoning- methanol, ethanol

- Colourless liquid, bitter taste
- Accumulation of toxic metabolites (formic acid, acetaldehyde, oxalic acid…)
- Metabolic acidosis with high anion gap (HAGMA)
- Main toxic manifestation in 6 to12 hours after ingestion
- Clinical signs + 2 non specific symptoms:

Osmolar gap ≥10 mOsm/l

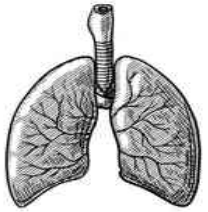
Metabolic acidosis (pH under 7.3, bicarbonate under 20 mEq/l)

High anion gap

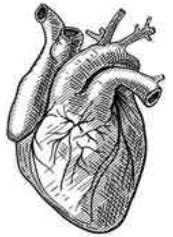
Toxic alcohol poisoning- symptoms

Extrapyramidal manifestations, headache, sopor, coma, brain swelling

Loss of color vision, mydriasis, „snow field“ central scotoma, blindness

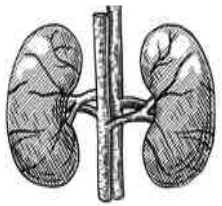


Tachypnoe, hyperventilation,dyspnoe, cyanosis, lung oedema



Systolic dysfunction, hypotension, tachycardia, dysrhythmia,cardical failure

1. Neurologiccal phase
2. Cardiopulmonary
3. Renal phase



Renal Failure

Toxic alcohol poisoning- therapy

- Non specific –shortly after ingestion succion of gastric content
  Specific – antidote as soon as possible after ingestion: 2 dcl 40% **ethanolu** to nasogastric tube (if possible)

+ start i.v ethanol aiming for 1-2‰

- Methyalcohol: give **folic acid**1 mg/kg max. 50 mg i.v. á 4 hours until disappearance of symptoms
- Ethylenglycol: give **pyridoxin** 50mg i.v. 4xdaily
  thiamin 100 mg i.m. 4x daily
- Fomepizol - specificic antidotum,

Take home message

- Acute intoxication should be considered in all unconscious patients of unclear etiology

- The algorithm of acute intoxication includes supportive therapy and stabilization of vital functions, prevention of further absorption of the poison, administration of an antidote and acceleration of the elimination of the poison
- All steps, including consultation with the Toxicology Information Center, should be carefully recorded in the documentation

Resources

Toxicological Information Center-TIS

- https://www.tis-cz.cz/index.php/odkazy

Diagnostic and therapeutic standard of carbon monoxide poisoning

https://urgmed.cz/

- MALÁSKA, Jan, Jan STAŠEK, Milan KRATOCHVÍL a Václav ZVONÍČEK. *Intenzivní medicína v praxi*. Praha: Maxdorf, [2020]. Jessenius. ISBN isbn:978-80-7345-675-7.

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