هیدرو کربن‌های هالوژنه

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- Hydrocarbons are a diverse group of organic compounds consisting primarily of carbon and hydrogen atoms. The two basic forms of hydrocarbons are aliphatic (straight- or branched-chain) and cyclic configurations.

- Halogenated (halogen group) and aromatic (benzene ring) hydrocarbons are two examples of aliphatic and cyclic hydrocarbon subclassifications, respectively. Products containing hydrocarbons are found in many household and occupational settings

- Short-chain aliphatic compounds (up to 4 carbons), such as methane, ethane, propane, and butane, are gases; intermediate-chain aliphatic compounds (5 to 19 carbons), such as solvents, lamp oil, lighter fluid, and gasoline, are liquid; and long-chain aliphatic compounds (>19 carbons), such as waxes, are solids. Liquid hydrocarbons account for most exposures seen in the emergency department.

- Exposures to hydrocarbons and volatiles most commonly occur as ingestions or inhalations. Most hydrocarbon exposures have a benign clinical course
- Ingestions were more likely than inhalation to produce serious toxicity. Hydrocarbon aspiration accounts for 20% of aspiration accidents in children <5 years of age.

Pathophysiology and Clinical Features
Determinants of Toxicity

- The toxic potential of hydrocarbons depends on their physical characteristics (viscosity, surface tension, and volatility), chemical characteristics (aliphatic, aromatic, or halogenated), presence of toxic additives (pesticides or heavy metals), routes of exposure, concentration, and dose. The physical characteristics contribute the most to aspiration risk.

- Patients ingesting substances with viscosities of <60 SUS (e.g., gasoline, kerosene, mineral seal oil, turpentine, and aromatic and halogenated hydrocarbons) are at greater risk for aspiration than are those ingesting substances with viscosities of >100 SUS (e.g., diesel fuel, grease, mineral oil, paraffin wax, and petroleum jelly).

Pulmonary Toxicity

- Hydrocarbon aspiration causes chemical pneumonitis by direct toxic injury to the pulmonary parenchyma and altered surfactant function. Destruction of alveolar and capillary membranes results in increased vascular permeability and edema.

- The clinical manifestations of pulmonary aspiration are usually apparent almost immediately. The early effects result from irritation of the oral mucosa and tracheobronchial tree. Symptoms include coughing, choking, gasping, dyspnea, and burning of the mouth. Patients with these symptoms should be assumed to have aspirated.

- Changes may be seen as early as 30 minutes after aspiration, but **the initial radiograph in a symptomatic patient may be deceptively clear. Conversely, an asymptomatic patient can still have abnormal chest radiographic findings later during the clinical course.**

- Radiographic changes usually appear by 2 to 6 hours and are almost always present by 18 to 24 hours, if they are to occur. The most common radiologic finding is bilateral infiltrates at the bases.

Cardiac Toxicity

- Life-threatening dysrhythmias, such as ventricular tachycardia and ventricular fibrillation, may occur with systemic absorption (GI or inhalational) of a variety of hydrocarbon compounds. Most commonly, dysrhythmias occur after exposure to halogenated hydrocarbons and aromatic hydrocarbons. However, exposure to short-chain aliphatic hydrocarbons has also been reported to cause dysrhythmias (ventricular fibrillation).

Central Nervous System Toxicity

- Central nervous system effects (e.g., mental status depression) may result from a direct toxic response to the systemic absorption of the hydrocarbon, may be an indirect result of severe hypoxia secondary to aspiration, or may be caused by simple asphyxiation due to the physical displacement of oxygen by the volatile hydrocarbon and/or or the use of a plastic bag (bagging) that prevents adequate oxygenation.

- Peripheral Nervous System Toxicity
- GI and Hepatic Toxicities
- Renal and Metabolic Toxicities
- Hematologic Toxicity
- Dermal Toxicity

Diagnosis

- Diagnosis of hydrocarbon toxicity is based on a composite picture, incorporating the findings of the history, physical examination, bedside cardiac and pulmonary monitoring, laboratory tests, and chest radiography.

Treatment

- Securing the airway and maintaining ventilation is the critical maneuver in patients who present with respiratory depression and/or significant neurologic depression
- Administration of nebulized oxygen is indicated in the treatment of pulmonary aspiration. Inhaled b_2 agonists may also be useful, especially in the setting of bronchospasm, but their role in the treatment of hydrocarbon pneumonitis has not been studied.
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- Positive end-expiratory pressure or continuous positive pressure airway ventilation may sometimes be required to maintain oxygenation, but increases the potential for further injury from barotrauma, such as the development of pneumatoceles or pneumothorax.

- In cases of severe pulmonary aspiration resulting in refractory hypoxemia, treatment with high-frequency jet ventilation or extracorporeal membrane oxygenation has proved successful according to case reports.