Hydrogen Fluoride

Hydrogen Fluoride (Fluoric acid, Hydrofluoric acid, Fluorine monohydride, ammonium bifluoride)

FORMS: Gas, liquid. (Fluoride salts in the presence of acids may generate Hydrogen Sulfide) Metal cleaners and tire rim cleaners.

ROUTES OF EXPOSURE: Skin and eye, inhalation, ingestion.

SIGNS AND SYMPTOMS:

CNS: Symptoms of hypoxia, stupor, lethargy and coma.

Eye: Chemical conjunctivitis, opacification of the cornea and blindness.

Cardiovascular: Rhythm abnormality is tachycardia or segment prolongation, calcium gluconate preferred. Ventricular ectopy, multifocal PVCs, torsades, bradycardia or heart block, VF and VT, calcium chloride preferred.

Respiratory: Acute pulmonary edema, asphyxia and chemical pneumonitis. Upper airway obstruction with stridor, pain and cough due to edema.

Gastrointestinal: Acute toxicity results in burns to the mouth, esophagus, stomach and lower G.I. tract. Nausea, vomiting and diarrhea, possibly containing blood.

Skin: Severe pain with normal looking skin surface. Burn is in lower skin layers. Bone may be involved. Damage may be severe with no outward signs, except patient will complain of intense pain.

Other: Hydrogen fluoride will form hydrofluoric acid upon contact with water, such as in the respiratory system. Hydrogen fluoride exposures cause **extreme** pain, and improvements in pain can be used to assess for adequate treatment. Both hypocalcemia and hyperkalemia can be associated with cardiac complications.

Pre-Medical Control

PARAMEDIC

1. Follow **General HazMat Treatment** protocol.
2. Dysrhythmias (as listed above) may be treated with IV injections of Calcium Gluconate 1 gm of 10% solution IVP in flushed line. Repeat if dysrhythmia persists.
3. In addition to Calcium Gluconate treatment, pain may also be treated per the **Pain Management Procedure**.

Inhalation Exposure

1. Add 5ml Calcium Gluconate 10% to 20ml sterile water. Use 5ml for nebulizer. Repeat as needed.
2. Consider CPAP to improve ventilation if needed

Eye Exposure

1. Follow **HAZMAT Eye Irrigation** protocol.
2. Remove contact lenses if present.
3. Irrigate immediately with water or saline
4. Once available, irrigate with a 1% aqueous solution of Calcium Gluconate (50ml of 10% Calcium Gluconate in 450 ml of NS).
5. Continue irrigation with NS or water until arrival at the hospital or directed by medical control.

Skin Exposure

1. Large volume irrigation may be necessary.
2. Prepare a Calcium Gluconate gel by mixing 1 amp of 10% Calcium Gluconate per ounce of K-Y jelly.
3. Apply the gel to burned areas. Apply an occlusive dressing over the gel.

Ingestion Exposure

1. Do not induce emesis or administer Activated Charcoal.
2. If patient is alert and able to swallow give 4-8 oz. of water.
3. Treat dysrhythmias according to appropriate protocol in addition to the Calcium Gluconate.

Post-Medical Control

1. Calcium Chloride may be substituted for Calcium Gluconate for IV administration to treat dysrhythmias as listed above.

2. Medical Control may also order Magnesium Sulfate for treatment of dysrhythmias.

SPECIAL CONSIDERATIONS:

Pain relief is usually used as an end point for Calcium Gluconate treatment.

The patient who has a significant exposure and is experiencing severe complications has a very poor prognosis. Treatment should be geared towards calcium replacement and care should be given to prevent the possibility of secondary contamination.

Hyperkalemia presents initially with peaked T-waves and may progress to widening of the QRS complex, with either tachydysrhythmias or bradydysrhythmias.

Hypocalcemia produces Q-T prolongation, which can progress into frank arrhythmias.

Victims exposed to hydrogen fluoride vapor do not pose substantial risks of secondary contamination. Victims exposed to hydrogen fluoride liquid, solution or condensed vapor do pose secondary contamination risks to EMS personnel.