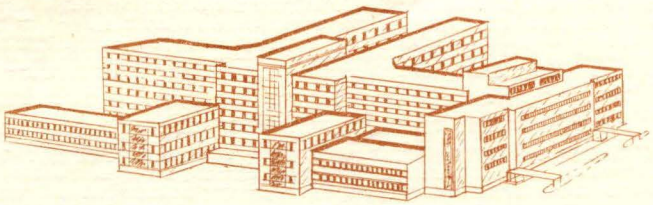

THE MOSES H. CONE MEMORIAL HOSPITAL

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TOXICOLOGY UPDATE

At the recent National Poison Center Network Toxicology Symposium, current thinking on the treatment of common overdoses and exposures to toxic substances was presented. The meeting dealt with petroleum distillates, snake bites and toxic plants. A brief review of these topics is presented and the general measures for the treatment of overdoses and poisonings.

Petroleum Distillates

The induction of emesis following a hydrocarbon ingestion has long been a subject of controversy. Presently, most authorities do not advocate inducing vomiting unless the hydrocarbon contains a toxin such as the heavy metals or an organophosphate insecticide. Cautious gastric lavage also is not usually recommended due to potential aspiration and subsequent pneumonia. Reasons for not inducing vomiting include: 1) Risk of aspiration, particularly with low viscosity hydrocarbons. 2) Reported systemic reactions to hydrocarbon ingestions have been quite rare and have involved very large quantities, much larger than a child would ingest. 3) Limited toxicity potential. The liver extracts and detoxifies much of any hydrocarbon that is absorbed.

The possibility for aspiration exists in any petroleum distillate exposure whether or not the patient has vomited spontaneously. To determine the likelihood of pulmonary problems developing, the following steps can be undertaken: 1) Obtain baseline blood gas values. 2) Administer oxygen for five minutes. 3) Repeat the blood gas determinations. If there is a significant difference in the pre- and post-oxygen values, no serious pulmonary problems are apt to develop. On the other hand, if there is no significant difference in the values, problems are very likely to develop, even if signs of aspiration are not evident on x-ray.

Snake Bites

Two different philosophies are currently popular in the U.S. concerning the treatment of pit viper envenomation. One school advocates the immediate use of antivenin in nearly all cases, even though a substantial percentage of the population is allergic to horse serum. Proponents of antivenin claim that the reaction to the horse serum is not as severe and can be managed more easily than the systemic reaction to the pit viper venom. Ten vials or more of antivenin have been used in severe envenomations.

A newer approach, which has gained popularity particularly in Texas, is a surgical one, calling on the expertise of the plastic surgeon. This approach is based on the fact that a snake bite is basically a local phenomenon up until two hours after the bite, after which systemic symptoms are apparent. The surgeon excises a square of skin large enough to take in all the ecchymosis surrounding the bite. After the skin has been removed, all the hemorrhagic tissue underneath is cut out, taking with it a large majority of the venom. The wound is then thoroughly cleaned, the square of skin is defatted and placed back on the wound and stitched in place. Excellent results have been obtained with the only problems encountered being some drainage from the wound for 7-10 days. No infections have been observed. The surgical approach is useful and effective when initiated within two hours of the bite. After this time, systemic effects may occur. The antivenin is very effective in treating these effects and should be used when they occur.

Other general measures to be followed in a snake bite include: 1) Immobilization of the affected limb. 2) Application of a light tourniquet. The venom travels mainly through the lymphatics and a light tourniquet is all that is required to block this route. 3) Application of cold to the bite to decrease the spread of the venom and provide some topical analgesia. A cold beverage can strapped to the site serves very well if away from "civilization" on a camping trip.

It is important to remember that not all snake bites result in envenomation. If edema and ecchymosis do not develop in the area surrounding the bite within 30 minutes, envenomation has not occurred and treatment is then that of a laceration.

Toxic Plants

Many plants, both indoor and outdoor are toxic. Most are GI irritants causing nausea, vomiting, diarrhea or intense burning of the oral cavity. Now that Spring is here, a brief review of those plants which are particularly dangerous is presented.

1. Hyacinth, daffodil and iris - the entire plant is a GI irritant with the bulb containing the most potential for causing problems. Milk or ice cream is the recommended treatment in most cases.

2. Cherry, peach, plum, apple and apricot trees - the entire plant is toxic including leaves, stems, branches and bark as well as the seeds of the fruit. The trees are loaded with cyanogens and substantial toxicity is possible if significant amounts are ingested. Two to five peach pits have enough cyanide-producing potential to kill a three year old child. One death has been reported in an individual who considered himself a "gourmet" and ate a cupful of apple seeds. Treatment with the cyanide antidote kit, containing sodium nitrate and sodium thiosulfate, should be begun if symptoms of cyanide poisoning occur. These symptoms include sudden loss of consciousness or weakness, headache, anxiety, confusion, tingling and numbness in the hands and a feeling of stiffness in the lower jaw. Often the skin is brick-red and there may be elevation of blood pressure. Violent convulsions and opisthotonus develop in the terminal stages followed by paralysis and respiratory arrest.

3. Azalea and rhododendron - all parts of the plants are toxic, containing the substance andromedotoxin. Poisoning has resulted from drinking a "tea" from the leaves, from sucking on the flowers, from eating honey made from nectar from these plants and from drinking punch with azalea blossoms floating on it. Symptoms may be immediate or delayed up to six hours. Watering of the eyes and mouth and nasal discharge are the first toxic symptoms. These may progress to a feeling of weakness, progressive paralysis of the limbs and convulsions. Deaths have been reported from these plants. Treatment consists of lavage followed by a cathartic. Hypotension can be treated with sympathomimetics but other therapy must be symptomatic and supportive.

4. Larkspur seeds - while the whole plant is toxic, the larkspur seeds contain the alkaloid delphinine. Paresthesias, particularly in areas innervated by the trigeminal nerve, are prominent and may involve the entire body. Cardiovascular collapse may occur leading to respiratory depression and failure. Death may occur within six hours of ingestion. Treatment consists of lavage, activated charcoal administration followed by a cathartic. Intensive support may be necessary in the event cardiac arrhythmias or respiratory difficulties develop.

5. Castor beans - the castor oil plant seeds contain ricin, the third most toxic substance known to man, which causes hemagglutination and has antigenic properties. Two seeds can kill a child, five seeds can kill an adult. Symptoms may be delayed by as much as eighteen hours and begin with a burning sensation in the oral cavity followed by nausea, vomiting and bloody diarrhea. These are followed by prostration, dizziness and convulsions. Uremia may develop leading to hypotension and eventually circulatory collapse. Good supportive care is necessary since no specific antidote is known for ricin. Even with good management, mortality rates of about 5-6% occur.

6. Oleander and lily of the valley - these plants contain at least four cardiac glycosides, each one ten times more toxic than digoxin. One leaf can kill an adult. It produces intense oral irritation and

edema and leads to severe GI upset and vomiting within 20 minutes after swallowing. An EKG of a patient who has ingested oleander is identical to one seen in a digitalis overdose. If there are no signs of gastroenteritis, emesis and lavage are indicated. Demulcents such as milk are helpful in therapy of the GI upset. Measures appropriate to the treatment of digitalis overdose should be undertaken if needed. KCl may be indicated as well as atropine or propranolol depending on the clinical situation.

General Measures

A majority of ingestions (about 85%) require little or no treatment. For the other 15% which require medical attention, evacuation of the stomach is a primary goal. For the induction of emesis, syrup of ipecac is the drug of choice. For children less than one year old, 10 ml is the recommended dose and for children older than one year and adults 15 ml should be given. Some centers advocate the use of 30 ml in adults. The dose of ipecac should be followed by at least 240 ml (one cupful) of water. This dose will be effective in 80-85% of patients. The dose can be repeated in 20 minutes if emesis does not occur. Ninety to ninety-five percent of all patients will respond to the second dose of ipecac. No more than the two doses should be given.

In addition to emesis, gastric lavage should also be employed to empty the stomach. The largest possible tube should be passed and between 2000 and 5000 ml of fluid used for lavage. For children 0.45% Sodium Chloride (1/2 Normal Saline) is recommended and for adults 0.9% Sodium Chloride (Normal Saline) should be used. "Fancy" solutions sometimes recommended for lavage, such as potassium permanganate or sodium sulfate, are not necessary in most situations. Valuable time may also be lost trying to obtain these solutions. The lavage fluid should be at room temperature since iced fluids may cause hypothermia, particularly in children. The tube should be moved around frequently to ensure adequate evacuation. Consideration should be given to leaving the tube in place after lavage is complete to allow administration of activated charcoal or other solutions or for continuous suction to remove drugs that may be excreted back into the stomach following absorption, e.g., tricyclic antidepressants.

Activated charcoal is a third therapeutic measure invaluable in the treatment of overdoses and poisonings. For children 30 gm should be given and for adults 50 gm is recommended. More than one dose may be necessary. Activated charcoal is very effective in adsorbing most drugs and toxins that may be ingested. The charcoal should be given after ipecac has induced vomiting since it will adsorb the ipecac and greatly decrease its effectiveness.

Other treatments often advocated, e.g., forced diuresis, alkalinization of the urine and peritoneal or hemo-dialysis are rarely effective but can be tried on very sick patients. These measures often cause serious problems of their own, further complicating therapy. The recent introduction of the charcoal hemoperfusion filter has created much interest as a means of rapidly cleaning toxins from the bloodstream. While some

investigators have reported good results, most toxicologists at the recent seminar did not recommend its use, citing conflicting reports on efficacy, lack of clinical experience and high cost to the patient in relation to the lack of proven benefit. The pharmacy has two of these filters on hand. The filter must be used with a hemodialysis machine.

The key to treatment of overdoses is simplicity. Exotic measures often create additional problems. The three cornerstones of therapy, ipecac, lavage and activated charcoal, in conjunction with adequate supportive measures and good nursing care, will produce complete recovery in a great majority of cases.

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