DEMOGRAPHIC AND CLINICAL PROFILE OF CORROSIVE POISONING - JANUARY 2010 -DECEMBER 2010

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Abstract : The corrosives are the substances that cause tissue injury by chemical reaction. Due to widespread use of these substances for household cleaning purposes as well as in industry there is a rising trend in patients getting admitted with corrosive ingestion either accidentally or with self-harming intention. To analyze the corrosive poisoning profile, a retrospective study was conducted at Poison Control, Training and Research Centre, Rajiv Gandhi Government General hospital Madras Medical College during the period January 2010- December 2010. During the above period 182 corrosive poisoning cases were admitted which comprises of 6.8 of total admission in intensive toxicology care unit. These cases were analyzed on the basis of demographic, clinical and mortality profile. Demographic profile was analyzed with respect to age, sex, and place. Clinical profile and mortality profile were analyzed separately with reference to the parameters like type of corrosive, intention of poisoning, time window for endoscopy, presenting complaint, comorbid illness, need for assisted ventilation and surgical intervention. Mortality profile was then compared with general clinical profile and difference between them was highlighted. This will guide in future for earlier prediction of the dangerous signs and symptoms in corrosive poisoning cases and prompt action to reduce the mortality rate.

Keyword : corrosive poison, acid, alkali.

Introduction: The corrosives are the substances that cause both functional and histological damage on contact with tissue surfaces. In this industrialized world, household and industrial exposures to corrosive agents constitute a potentially life-threatening global health concern. Due to easy accessibility of corrosive as they are widely used in home for cleaning purpose, cases are in the rising trend throughout the globe. Children are unintentionally exposed to household products whereas adults are exposed to household or industrial products that result in either occupational exposure or suicide attempts.

Aim: To study the demographic, clinical and mortality profile of corrosive poisoning cases admitted in the Poison Control, Training and Research Centre in Madras Medical College & Rajiv Gandhi Government General Hospital, Chennai during the period January 2010 to December 2010.

Method: In retrospective analysis, 182 corrosive poisoning cases were evaluated on the basis of demographic profile such as age, sex, and clinical profile such as presenting complaint, type of corrosive ingestion, circumstances of poisoning, time to reach hospital, co-morbid illness, alcohol influence, and need for assisted ventilation, intensive care stay and mortality.

Results: Of 2674 total admission in toxicology intensive care unit, 182 cases were due to corrosive poisoning which accounts to 6.8% of total admission. We analyzed these data under three major headings as demographic profile, clinical profile and mortality profile. These results were as follows.

On analyzing the demographic data about corrosive poisoning cases most of the cases are in the productive age group i.e., between 20 years of age to 60 years of age accounting about 129 cases (70.9%) followed by people above the age of 60 years - 37 cases (20.33%) and less in the age group below the age of 20 with 16 cases (8.79%). Regarding sex distribution, female cases were 102 (56%) in number which were higher in comparison to male cases 80 (44%). People living in the urban area were high with 149 cases (81.8%) whereas rural people admitted with corrosive poisoning were 33 cases (18.14%) which clearly show easily availability of corrosive substances for the urban living people as it is mainly widely used in homes for cleaning purposes as well as in industries. On analyzing the clinical profile data, major route for toxicity was seen with ingestion of corrosive poison - 178 cases (97.8%), followed by inhalation in 4 cases (2.2%). Suicidal intention (152 cases) was the prime motive behind the poisoning seconded by accidental poisoning (30 cases). Accidental poisoning was common among the children & people working in the industries.
188 cases were undergone the procedure. Out of 6 cases in which within 12 hour time limit for upper gastro intestinal endoscopy, only severity and planning our management. Out of 124 cases admitted procedure has to be done within 12 hours of corrosive ingestion. guides the treatment option for corrosive poisoning (14,27). This endoscopy is the only reliable investigation tool that assesses the clinical profile of all corrosive poisoning cases. was 7.14% (13cases). Few observations in mortality profile from our study. Mortality rate for corrosive poisoning in our centre rate and its subdivision, following are the observations we made in addition to suicidal poisoning. On assessing about the mortality intoxication also contributes to ac cidental consumption of corrosive also not contributory and unreli able indicator of corrosive poisoning. Contrary, exposure to an acid, hydrogen (H+) ions desicate epithelial cells, producing an eschar and resulting in coagulation necrosis (1,2,27,28). Dissociated anions of the acid also act as reducing agents further injuring tissue. The extent of injury due to corrosive is determined by duration of contact; ability of the substance to penetrate tissues; volume concentration and the presence or absence of food in the stomach. Neutralization of caustics takes place at the expense of the tissues, resulting in the release of thermal energy, producing burns. Common sources for corrosive are house hold cleaning products (27, 28) such as bleaches, detergents, disinfectants, anti-septic, drain cleaners which contains alkali or acid as main constituents like benzalkonium chloride, sodium hypochlorite, hydrochloric acid, oxalic acid, phenol, sulfuric acid etc. Injuries caused by corrosive are broadly divided into direct effect of corrosive on tissue and indirect deleterious effect. Organs more vulnerable to direct effect of corrosives are gastrointestinal tract followed by respiratory tract, eyes, and skin. Morbidity and mortality are mainly due to oral ingestion (27). Indirect effect of corrosives is due to absorption of non-ionized acid from the stomach mucosa that may result in acidemia and produce metabolic acidosis. Ingestion of hydrochloric acid results in a hyperchloremic normal anion gap metabolic acidosis whereas as sulfuric acid result in an elevated anion gap metabolic acidosis. Ingestion of hydrochloric acid to the development of mediastinitis or peritonitis. On clinical presentation, alkaline or acid agents produce severe pain of the lips, mouth, throat, chest, or abdomen. Symptoms of esophageal involvement include dysphagia and odynophagia, whereas epigastric pain and hematemesis may be symptoms of gastric involvement (16, 8). Symptoms and signs of corrosive poisoning are poor predictors of severity of injury to esophagus or stomach (1,4). Per abdominal examination is also not contributory and unreliable indicator of corrosive poison (6, 27). Absence of pain or abdominal signs doesn’t rule out life threatening gastrointestinal injury. Regarding imaging modalities for diagnosing and assessing the

Figure 2 -Compounds in corrosive poisoning
When analyzing the compound in corrosive poisoning, alkali was the major with 120 cases (65.93%) followed by acid consumption with 62 cases (34.07%). As the poisoning is common among the urban people, direct admissions without referral to our hospital were higher 157 cases (86.26%) on comparing with referral from other hospital. On analyzing the presenting complaint burning pain of the throat and abdomen was the predominant complaint in 84 cases (46.15%), followed by dysphagia & dysphonia in 42 cases (23%), vomiting in 34 cases (16.68%) and hematemesis in 22 cases (12%). It reveals that group of symptoms occurs in corrosive poisoning cases and single symptom alone cannot predict the severity of the injury. Time window i.e. duration between ingestion of poison to upper gastrointestinal endoscopy procedure was within 12hrs for 124 cases (68.13%). Early endoscopy offers a rapid means of obtaining diagnostic and prognostic information while shortening the period of time that patients forego nutritional support, permitting more precise treatment regimens (13,14). Upper gastro-intestinal endoscopy is the only reliable investigation tool that assesses the severity by grading the esophageal as well as gastric injury and guides the treatment option for corrosive poisoning (27,28). This procedure has to be done within 12 hours of corrosive ingestion. Hence this time limit was kept as time window to assess the severity and planning our management. Out of 124 cases admitted within 12 hour time limit for upper gastrointestinal endoscopy, only 118 cases were undergone the procedure. Out of 6 cases in which endoscopy was not done, 4 cases were due to hemodynamic instability and 2 cases were not willing for the procedure. Following grading system (10) was used to assess the injury.

Grade I - hyperemia or edema of the mucosa without evidence of ulcer formation, Grade II - sub mucosal lesions, ulcerations, and exudate.IIa - non circumferential lesions, II b - near-circumferential injuries.

Grade III - deep ulcers and necrosis into the peri-esophageal tissues. In our cases grade 1 injury was seen in 46 cases (38.9%) out of 118 cases, followed by normal study in 20 cases (16.9%).Duration of intensive care management and intensive care bed occupancy by corrosive poisoning was analyzed. Intensive care hospital stay was less than 1 day for more than half of the patients admitted with corrosive poisoning 93 cases (51%). On assessing the association of comorbid illness with corrosive poisoning, depression is on the top and seen in 35 cases (19.23%), common in female gender. Corrosive poisoning under the influence of alcohol is seen in 17 cases (21.25%) of total 80 male cases. Alcohol intoxication also contributes to accidental consumption of corrosive in addition to suicidal poisoning. On assessing about the mortality rate and its subdivision, following are the observations we made from our study. Mortality rate for corrosive poisoning in our centre was 7.14% (13cases). Few observations in mortality profile parameters were in contrary to those parameters observed in clinical profile of all corrosive poisoning cases.
severity of injury, chest and abdominal radiographs are used in the initial stages to detect gross signs of esophageal or gastric perforation such as pneumomediastinum, pneumoperitoneum (9, 10). Sensitivity of imaging studies is limited and absence of findings does not preclude perforation. Enteric contrast radiography is useful to assess the extent of esophageal injury in acute cases if endoscopy is not possible and in late stages for detecting stricture formation (9,10,20,27). Computed tomography has great sensitivity at detecting extra luminal air which is as a sign of perforation and visualize the esophagus, stomach distal to severe caustic burns that cannot be safely seen using endoscopy or contrast (11,14,27).

Endoscopy which is done to visualize the esophagus, stomach and duodenum after corrosive poisoning serves multiple purposes as it offers a rapid means of obtaining diagnostic and prognostic information, permitting more precise treatment and shortening the period of hospital stay (15,14,17,19,27). With the help of endoscopy, grading of corrosive injury to esophagus are done, which clearly details the prognosis as well as predicts the formation of strictures that can occur later (15,16). Grade I burns carry no risk of stricture formation. Grade II circumferential burns lead to stricture formation in approximately 75% of cases. Grade III burns invariably progress to stricture formation and are also at a high risk of perforation. Hence endoscopy is the standard diagnostic tool and should be done in all patients admitted for corrosive ingestion with intention (15,16,26,27). Endoscopy should be performed within 12 hours as numerous case series demonstrate that the procedure is safe during this period with minimal risk of perforation (27,28). Endoscopy should not be done if there is hemodynamic instability.

Grade II or III corrosive injuries are prone for stricture formation (15,16,20,27), which is a dreadful long term complication. Corrosive injuries to either esophagus or stomach or both will lead to neovascularization and fibroblast proliferation. This leads to laying down new collagen and replacing the damaged tissue with granulation tissue there by forming dense scar. The scar in turn leads to shortening of lumen of esophagus or stomach or both clinically presenting as a stricture (27,28,30,1) leading to dysphagia and significant nutritional deficits. Other long term problems are carcinoma of esophagus (15,27), gastric atony, pseudo-diverticula (18), gastric outlet obstruction (19) and tracheo-esophageal fistulas. Regarding the incidence of carcinoma, survivors of corrosive poisoning have 1000 times high risk than that of the general population and appears to present with a latency of up to 40 years (21,22,27)

Regarding treatment options in our centre all patients with presumed corrosive exposure were admitted. Decontamination of the patients was done. Careful and constant attention to signs and symptoms of respiratory distress, airway edema such as stridor were monitored (26). Prompt intubation with assisted ventilation was reserved for those who had respiratory distress and presence of shock and acidosis were addressed and treated (25,24,25,26). All patients admitted for corrosive ingestion were evaluated by hemoglobin estimation, early endoscopy in hemodynamically stable patient, imaging modalities, arterial blood gas analysis, blood grouping with cross matching, coagulation parameters, electrolytes and urine analysis. After grading the injury with endoscopy, those with Grade 1 and Grade 2a were started on oral feeds and transferred from intensive care unit to ward for observation. Patients with Grade 2b and 3 were treated in the intensive care unit with monitoring for development of complications like hemorrhagic shock, acidosis etc. The decision to perform surgery in patients with caustic ingestions was made if there was presence of perforation either in endoscopy or other diagnostic imaging or severe abdominal rigidity on clinical examination. These patients are under follow up in our hospital to assess the late complications like stricture (27), carcinomatous changes (27). To reduce the alarming rise of corrosive poisoning in the population, measures to be taken are successful implementation of child-proofing caustic substance containers and limiting the concentration of caustic agents in household items.

Conclusion:

On analyzing our study, the following conclusions were made. Alkaloids and acids can injure esophagus and stomach. The potential for tissue injury is dependent on the duration of contact, delay in seeking intensive treatment, volume, and pH of the product. There is no specific toxic dose or level because the concentration of corrosive solutions and the potency of caustic effects are widely variable (27,28). Degree of injury cannot be predicted by a single symptom and abdominal examination is also unreliable (3,5,6). Upper gastrointestinal endoscopy is the only diagnostic test available that reliably detects the degree of injury (14,15,16). Patients who are asymptomatic with OGD Grade 1 & 2a can be started on oral feeds safely and don't require intensive care management (16,26,27). Any attempt for gastric emptying or dilution is contraindicated in corrosive poisoning – no emetics, no charcoal & no blind nasogastric tube insertion. As there is a long latency period between corrosive ingestion and carcinoma (21,22,27) these patients need follow up. Psychiatric evaluation and management is a must for patients with intentional ingestion to prevent recurrence.
References:

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