

Original Article



The Impact of Initial Management for Pediatric Corrosive Ingestion in a Specialized Toxicology Center “Poison Control Center Ain Shams University Hospitals” (PCCASUH) on Long Term Outcome of Corrosive Ingestion Sequels

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ABSTRACT

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Background: Acute management of corrosive ingestion showing great variability among health care facilities, with some centers having experience and others lack it. **Aim of the Work:** aimed to investigate the pediatric cases with corrosive ingestion presented to Poison Control Center Ain-Shams University Hospitals (PCCASUH) from Jan. 2014 to Dec. 2018 and to compare long term outcome of these patients, with those referred from other non-specialized healthcare facilities to Pediatric Surgery department of Ain Shams University.

Patient and Methods: Observational retrospective study of two phases; the first included data collected from all pediatric patients' records received, treated and referred from PCCASUH. The second included all patients' records at pediatric surgery department with the diagnosis of corrosive ingestion during the same period, either referred from PCCASUH or other non-specialized health care facilities. Group I: patients referred from PCCASUH, Group II patients referred from other non-specialized healthcare facilities with analysis of their outcome (feeding gastrostomy, endoscopic dilatation alone, colonic interposition, esophageal resection and anastomosis, corrective surgery for gastric outlet obstruction, long term disability, and late mortality). **Results:** The PCCASUH received 661 pediatric patient during (2014-2018) with Caustic alkali represented (89.5%). Gastrointestinal manifestations were the chief presentation of the more 50% of cases. Pediatric surgery department received 59 from PCCASUH (group I), and 178 not referred from PCCASUH (group II). Although the long term disabilities (permanent tracheostomy, laryngeal injury, and retained gastrostomy) were recorded only in group II, the need for feeding gastrostomy more in (group II), was the only significant difference between both groups. **Conclusion and recommendations:** Pediatric patients with acute corrosive ingestion have better long term sequels if they were initially managed in specialized toxicology center like PCCASUH. Standardization of protocols of management, establishment of communication channels with specialized toxicology center, and national registry of acute corrosive ingestion in pediatrics is mandatory.

Keywords: Esophageal stricture, Caustics ingestion, Esophageal replacement, Gastric outlet obstruction, Gastrostomy.

I. INTRODUCTION

Caustic injury remains an important public health problem all over the world despite various education and regulatory efforts to reduce its occurrence (Vandenplas, 2017). Accidental ingestion of caustic agents continues to be a significant problem world-wide especially in developing countries and particularly in the under 6 year age group. Clinical presentation is highly variable and the initial management should involve careful assessment of the extent of injury. Patients with minimal ingestion may be asymptomatic but others may experience oropharyngeal, retrosternal or epigastric pain (Rafeey et al., 2015).

Caustic ingestions may cause serious injuries and long-term complications seen among children, including perforation that often results in death (De Lusong et al., 2017). Rafeey et al. (2015) stated that; the early proper management and follow up of patients result in the early diagnosis of complications and the application of continues therapeutic recommendations and health care. The most common complications are esophageal and gastric stenosis, which are found in greater percentage than in poisonings with acid substances. In-addition, Long-term complications include stricture and increased lifetime risk of esophageal carcinoma (Vandenplas, 2017). This work aimed to

investigate the pediatric cases with corrosive ingestion presented to Poison Control Center Ain-Shams University Hospitals (PCCASUH) from Jan. 2014 to Dec. 2018 and to compare long term outcome of these patients, with those referred from other non-specialized healthcare facilities to Pediatric Surgery department of Ain Shams University

II. PATIENTS AND METHOD

This was a retrospective study on all pediatric patients received by PSASU after ingestion of caustic agents that referred from PCCAUH and other healthcare facilities from January 2014 till December 2018. It was held at PCCASUH and PSASU, after the Scientific and Ethical Committee of the Faculty of Medicine Ain-Shams University approved the study.

➤ Grouping:

The first phase of this study included all pediatric patients received, admitted and treated from corrosive ingestion at PCCASUH in the study period. Data were collected from a specially designed computerized program from PCCASUH data base system that; comprised demographic, clinical and management data.

The second phase of this study included all patients who were admitted at PSASU with the diagnosis of

corrosive ingestion, and subsequently dividing them into two main groups:

Group I: all pediatric patients diagnosed as corrosive ingestion and referred from PCCASUH.

Group II: all pediatric patients diagnosed as corrosive ingestion and referred from other non-specialized healthcare facilities.

Data collection

For all patients of Group I; the following data were reviewed:

- Demographic data included; name, hospital number, age, sex, address, and type of ingested corrosive.
- Patient's clinical data on arrival (hemodynamic status, neurological, respiratory, cardiovascular, gastrointestinal and mucocutaneous affection), hospital admission (ward or ICU) and period stay, Treatment given, and type of discharge (cured, follow up at PCCASUH, discharge with disability, referral to PSASU or death).

For all patients of Group I and II; the following data were reviewed:

- The available referral data for group II and Data from PCCASUH for group I were reviewed and collected as; Date of the referral for pediatric surgery department, causes of referral, duration from caustic injury ingestion till referral, site from which they were referred.

- Positive findings of radiological and laboratory studies done were included on primary presentation, during admission and on discharge.

➤ Statistical analysis

Chi-Square test used to compare the outcome between acute corrosive pediatric cases referred from PCCASUH and those from other healthcare facilities, with P value < 0.05 considered statistically significant.

➤ Ethical Consideration

Research Ethics Committee (REC) Faculty of Medicine, Ain Shams University (FWA 000017858). An approval was obtained from the director of the PCCASUH and head of PSASU. Anonymous recording was done as well as all confidentiality issues were preserved.

III. RESULTS

➤ Phase 1:

During the period from January 2014 till December 2018, PCCASUH received 661 pediatric patients with corrosive ingestion. The age of most of the cases were between 1-5 years (87-100%), while adolescent were the least (0-4.3%). Regarding sex distribution, males were more presented (51.7-59%) than females (41-48.3%) through the period of the study (Table 2). Most of the cases came from urban region (54-75.7%) (Table 3). The ingested corrosive was alkali in the majority of cases (55-89.5%) (Table 4). The presenting symptoms are illustrated

in Table (5), while the durations of admissions in PCCASUH shown in (table 6). The majority of cases discharged after recovery or for follow up (68.3-95%). The annual rate of referral to pediatric

surgery department ranged between 2.4-18.3% of the whole received cases (Table 7).

Table 2: Age and sex distribution of acute corrosive pediatric cases received at PCCASUH throughout 2014- 2018.

Age / year	2014		2015		2016		2017		2018	
	No	%	No	%	No	%	No	%	No	%
1-5	29	100	90	78	100	83	220	77	100	89
6-12	0	0	10	8.6	10	8.3	27	9.4	3	2.6
12-18	0	0	5	4.3	10	8.3	38	13.3	9	8
Total	29		115		120		285		112	
Gender	No	%	No	%	No	%	No	%	No	%
Male	15	51.7	52	57.8	50	55	169	59	63	58
Female	14	48.3	38	42	41	45	118	41	46	42
Total	29		115		120		285		112	

Table 3: Residence distribution of acute corrosive pediatric cases received at PCCASUH throughout 2014- 2018.

Residence/ year	2014		2015		2016		2017		2018	
	No	%	No	%	No	%	No	%	No	%
Urban	20	69	65	56.5	65	54	216	75.7	70	63
Rural	9	31	50	43.7	55	46	69	42.2	42	37
Total	29		115		120		285		112	

Table 4: Type of caustic agents in acute corrosive pediatric cases received at PCCASUH throughout 2014- 2018.

Corrosive/year	2014		2015		2016		2017		2018	
	No	%	No	%	No	%	No	%	No	%
Alkali	25	82.6	65	55	114	95	255	89.5	87	77.6
Acid	4	17.4	50	45	6	5	30	10.5	25	22.4
Total	29		115		120		285		112	

Table (5): Acute clinical presentations of pediatric cases with corrosive ingestion received at PCCASUH throughout 2014- 2018.

Clinical Symptoms / Year	2014		2015		2016		2017		2018	
	No	(%)	No	(%)	No	(%)	No	(%)	No	(%)
Tachycardia	20	69	61	53	26	21.6	50	17.5	18	16
Tachypnea	12	41.3	7	6	0	0	60	21	2	1.8
Respiratory distress/ rhonchi/ crepitation	4	13.7	30	26	18	15	43	15	16	14
Nausea/vomiting	16	55.1	68	59	46	38.3	130	45.6	64	57.1
Dysphagia	14	48.2	47	41	43	35.8	90	38	55	49
GIT bleeding	3	10.3	23	20	19	15	30	10.5	24	21.4
Stridor	0	0	1	0.8	0	0	5	1.7	1	0.9
Skin burn	3	10.3	21	18	12	10	27	9.4	8	7.1
Lip edema	4	13.7	12	10.4	18	15	60	21	8	7.1
Total	29		115		120		285		112	

Table 6: Period of hospitalization acute corrosive pediatric cases received at PCCASUH throughout 2014- 2018.

Period of hospitalization/ Year	2014		2015		2016		2017		2018	
	No	(%)	No	(%)	No	(%)	No	(%)	No	(%)
< 1 day	2	6.8	45	39	52	43.3	250	87.7	61	54.4
1 – 3 days	16	55	30	26	20	16.6	25	8.7	29	26
3-5 days	5	17	6	5.2	5	4	5	1.7	10	8.9
5-7 days	3	10	10	8.7	2	1.6	3	1	5	4
>1 weak	3	10	24	20.8	40	33.3	2	0.07	7	5.8
Total	29		115		120		285		112	

Table 7: Fate of acute corrosive pediatric cases received at PCCASUH throughout 2014- 2018.

Fate/ Year	2014		2015		2016		2017		2018	
	No	(%)	No	(%)	No	(%)	No	(%)	No	(%)
Discharged	24	82.7	99	86	94	78.3	274	96.4	97	86.6
Referred to Pediatric Surgery Department	5	17.3	14	12	22	18.3	7	2.4	11	9.8
Death in acute phase	0		2	1.7	4	3	4	1.4	4	3.6
Total	29		115		120		285		112	

➤ Phase 2:

The PSASU dealt with 237 cases with corrosive ingestion during the same period, 59 (20.6%) cases were those who referred from the PCCASUH and the rest were referred after initial management in other healthcare facilities.

Group I: Of the 59 patients who were initially managed at PCCASUH, 3 (5%) patients were received on emergency basis (2 by esophageal perforation and 1 by gastric perforation). 33 (59%) of the patients were managed by gastrostomy for absolute dysphagia in the initial phase. 14 (23.7%) cases ended with esophageal replacement procedures. 37 (62.7%) were managed by

endoscopic esophageal dilatation alone and 5 (8.5%) were managed by surgical interventions for gastric outlet obstruction with endoscopic dilatation. The fate of this group of patients was complete cure in 55 patients and death in the 3 emergency received patients and 1 patient with esophageal replacement.

Group II: During the same period the PSASU received 178 cases referred from other healthcare facilities rather than PCCASUH. Gastrostomy was done for 127 cases (71.2%). 31 (17.4%) required esophageal replacement procedure, 3 (1.8%) required localized esophageal resection and anastomosis. 18

(10.1%) required gastric outlet obstruction corrective surgery. 126 (70.8%) were managed by endoscopic dilatation only. The fate of this group of patients was 11 deaths (8 due to complicated esophageal endoscopic dilatation, 2 from trachea-esophageal fistula, 1 following complicated esophageal replacement procedure). 7 discharged with disability (2 with permanent tracheostomy, 3 with recurrent aspiration (2 due to colonic redundancy and gastrocolic reflux and 1 from laryngeal injury) 2 patients with retained gastrostomy due to persistent esphagocolic

anastomotic stricture with intermittent food impaction and absolute dysphagia), and 160 with complete cure (Table 8).

Statistical analysis showed a significant difference only between cases referred from PCCASUH and those referred from other healthcare facilities as regards the need for gastrostomy feeding. No other significant difference as regards the fate and outcome between cases referred from PCCASUH and those from other healthcare facilities to pediatric surgery department of ASU.

Table 8: Chi-Square test statistical analysis comparison of outcome between acute corrosive pediatric cases referred from PCCASUH and those from other healthcare facilities throughout 2014- 2018

Groups	Fate	Gastrostomy	Endoscopic Dilatation	Colonic Interposition	Esophageal resection and anastomosis	Gastric outlet obstruction corrective surgery	Late Mortality	Disability
Group I: Referred from PCCASUH (Total 59)		33 (55.9%)	37 (62.7%)	14 (23.7%)	0 (0%)	5 (8.5%)	1 (1.7%)	0 (0%)
Group II: Referred from other healthcare facilities (Total 178)		127 (71.3%)	126 (70.8%)	31 (17.4%)	3 (1.7%)	18 (10.1%)	11 (6.2%)	7 (3.9%)
Chi Square (p value)		0.042*	0.318	0.379	0.74	0.91	0.308	0.27

P<0.05 = significant *: Statistically significant

IV. DISCUSSION

Caustic ingestion by children is still a serious medical problem especially among developing countries and one of the main causes of death in children less than 5 years (Kluger et al., 2015). This study described acute caustic ingestion pattern among Egyptian pediatric cases admitted to PCCASUH and those referred to PSASU throughout year 2014 to 2018. The accidental exposure to caustic household substances during

childhood, still an important issue in Egypt especially those uncontrolled and cheaper domestic cleaners introduced in open markets (Alazab et al., 2012). Corrosive ingestion constitutes 0.3% of pediatric admission in developing countries like Gambia and 0.5% in Nigeria, and was responsible for 0.8% of total childhood mortality in Gambia (Mowry et al., 2015). In developed countries, the percentage of pediatric emergency service admissions for

poisoning was between 0.28% and 0.66% (Kluger et al., 2015).

The first phase of this study, showed that 661 pediatric patient admitted to PCCASUH during 5 years period duration from 2014 to 2018, their age distribution were from one to five years (87-100%), while those adolescent were the least (0-4.3%). This was in agreement with Balderas et al. (2018) study, with age range: 1.7-16.3 (mean: 5.3) years, and 69% were below 5 years of age. Also this went with what was found in Mrazová et al. (2012) series about corrosive ingestion in Czech during 2009, where the most endangered age group was the 0-3 year old. The study also showed that, there was slight male predilection in the studied group (51.7-59%), which was in the contrary of Balderas et al. (2018) series with equal male and female distribution. Mrazová et al. (2012) showed slight female predilection in pediatric patients (51.8%). During these 5 years, the cases presented mainly from urban region (54-75.7%), more than rural areas. This was also in accordance with Patil et al. (2014) study that showed that the majority (77.4%) of corrosive ingestion among pediatric patients presented from 2004-2006 were from urban areas. Although strict assessment of the socioeconomic status was not possible from PCCASUH records, yet Johnson and Brigger, in 2012 postulated that, accidental ingestion of corrosive substances is relatively common especially among the illiterates with

poor socioeconomic status. Moreover, Millar and Numanoglu (2012) added that, poverty was also noted to be a contributory factor in corrosive ingestion.

As regard the nature of ingested caustic agent; the majority of cases (55-95%) were due to ingestion of alkali agents. This was in accordance to Adedeji et al. (2013) study, with 79% of their study population ingested alkali. Rafeey et al. (2016) attributed that most of pediatrics with caustic ingestion were accidental alkali ingestion because alkali usually kept in containers without sealed covers in manufacturing local soaps; and children confused these chemicals with water. Alkali tends to affect the esophagus, especially at areas of natural constrictions like the cricopharyngeal junction, with liquefactive necrosis and with more extensive disease up to esophageal perforations (Le Naoures et al., 2017). In the contrary; Acids causes coagulation necrosis of the mucosa, hard eschar formation, with limitation of acid penetration. Acids can lead to antral scarring and subsequent gastric outlet obstruction with its retarded (3-6 weeks) fibrosing sequels (Millar and Numanoglu, 2012).

The clinical spectrum of pediatric caustic ingestion can vary from no apparent injury to potentially fatal sequel (Han et al., 2014). In this study, mortality rate was 2.2%, and that was much lower than Lu et al. (2014) study, who investigated

cases with caustic ingestion, and found that 9.3% of the patients died during the acute stage as a result of esophageal perforation, hematemesis with sudden apnea, or aspiration pneumonia with respiratory failure. Struck et al. (2016), reported also that tracheal necrosis may occur and can be fatal.

Poison Control Center Ain Shams University Hospitals protocol of management for cases diagnosed as acute corrosive ingestion was described in this study (table 1). This protocol is nearly the same of Johnson et al. (2012), protocol who showed that, the use of antibiotics, steroids, and anti-reflux therapy were the main arms of initial management. They postulated the decrease of stricture formation to the use of antibiotics by decreasing bacterial counts in the necrotic tissue, and granulation tissue super infection is reduced. Steroids are to be most beneficial in preventing stricture formation but at high doses, it might cause undesirable side effects as peptic ulceration, and mycotic infection of the esophagus.

Le Naoures et al. (2017) study recorded routinely used antacids and anti-reflux therapy in order to prevent secondary reflux-associated esophageal injury which may act synergistically to further damage an already damaged area.

However, Ferraris (2016), prefer to check the adequacy of the patient's airway by fiberoptic laryngoscopy, and if the airway is unstable,

intubation under direct visualization is required. On the other hand, Kluger et al. (2015), prefer to routinely admit the patients and withhold oral intake till esophagostomy which was performed in the first 24- 48 hours.

The second phase of this study aimed to compare long term outcome (after full management of corrosive ingestion sequels at PCCASUH) of these pediatric patients with those referred from other non-specialized healthcare facilities to PSASU. In the latent phase of corrosive ingestion, the clinical diagnostic investigations are sometimes hard to perform. Patients referred to PSASU had contrast study after 3-6 weeks of exposure, to allow ongoing initial inflammation to settle. However, other centers like Tulane University School of Medicine, New Orleans, USA prefers to do barium swallow on day 12 for admitted patients (Chibishev et al., 2013) Long term complications of caustic ingestion varied from esophageal strictures which may require multiple dilatations or esophageal replacement to the risk of developing esophageal cancer of esophagus (Katz and Kluger, 2015).

In this study, long term disabilities (permanent trachesotomy, laryngeal injury, and permanent gastrostomy) were recorded only in group II, the need for feeding gastrostomy was statistically significant more in group II, this could be

explained by: first; the experience of initial management PCCASUH with well-established protocol and opened channel of referral for PSASU. Secondly; some of group II patients initially sought home-based therapy by traditional healers and only present at the hospital after complications had set in with severe weight loss and feeding difficulties Johnson and Brigger (2012) and De Lusong et al. (2017). Thirdly; the denial attitude of some of some parents who discharged their children against medical advice, only to represent when stricture had established and difficult to manage Kluger et al. (2015). This was in accordance with Vandenplas (2017) stated that, the lack of optimal care in the initial phase, has direct effect on the rate of complications, particularly strictures, and the outcome mainly depends on the initial management and care.

The limitations of this study were: first; the retrospective nature of our study. Second; the lack of knowledge about the protocols of initial management in health care facilities other than PCCASUH (which could be more or less effective in preventing the late complications) and the lack of presenting data of acute corrosive ingestion in pediatrics patients that were managed initially in health care facilities other than PCCASUH, as well as the early morbidity and mortality in these patients. National and international standardization of protocols of management of acute corrosive ingestion in pediatrics is

mandatory to provide adequate tool for assessing other factors affecting the long term sequels. It is a must to open adequate communications channels with specialized poison control centers like PCCASUH, and at the long term to establish a national registry system for such cases.

V. CONCLUSION

Pediatric patients with acute corrosive ingestion have better long term sequels if they were initially managed in specialized toxicology center like PCCAUH. Standardization of protocols of management, establishment of communication channels with specialized toxicology center, and national registry of acute corrosive ingestion in pediatrics is mandatory to provide adequate tools for assessing other factors affecting the long term sequels.

VI. RECOMMENDATION

1. National and international standardization of protocols of management of acute corrosive ingestion in pediatrics is mandatory to provide adequate tool for assessing other factors affecting the long term sequels.
2. It is a must to open adequate communications channels with specialized poison control centers like PCCASUH, and at the long term to establish a national registry system for such cases.

3. Evaluation of new investigational tools that help to assess short and long term morbidities of such cases with acute corrosive ingestion.

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تأثير العلاج الأولي لحالات التسمم بالمواد الكاوية للأطفال من خلال مراكز علاج التسمم المتخصصة مركز علاج التسمم مستشفيات جامع عين شمس علي النتائج طويلة المدى لهذه الحالات

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قسم الطب الشرعي والسموم الاكلينيكية ، كلية الطب ، جامعة عين شمس ، مصر ؛ * قسم جراحة الأطفال ، كلية الطب ، جامعة عين شمس ، مصر

الخلفية: العلاج الأولي لحالات التسمم الحاد بأبتلاع المواد الكاوية تبايناً كبيراً بين مراكز الرعاية الصحية، مع وجود بعض المراكز المتخصصة التي لديها الخبرة في هذا والبعض الآخر يفتقر إليها.

هدف العمل: يهدف إلى دراسة بعض حالات التسمم الحاد بأبتلاع المواد الكاوية لدي الأطفال والتي توجهت إلى مركز علاج التسمم بمستشفيات جامعة عين شمس من يناير 2014 إلى ديسمبر 2018 ومقارنة النتائج طويلة المدى لهؤلاء المرضى، مع أولئك المحالين من مراكز رعاية صحية اخري غير متخصصة لتلقي العلاج للمضاعفات ما بعد التسمم لقسم جراحة الأطفال بجامعة عين شمس.

طريقة البحث: دراسة استرجاعية على مرحلتين الأولى تتضمن البيانات من سجلات المرضى الأطفال المتعرضين للتسمم بالمواد الكاوية والتي تم معالجتهم في مركز علاج التسمم بمستشفيات جامعة عين شمس. والثانية اشملت على بيانات المرضى التي تم إحالتها الي قسم جراحة الأطفال بمستشفيات جامعة عين شمس الذين تم تشخيصهم بالتسمم الحاد بالمواد الكاوية خلال نفس الفترة، سواء الذين تمت إحالتهم من مركز علاج التسمم بمستشفيات جامعة عين شمس أو حولوا من مراكز رعاية صحية الأخرى. وقد تقسم المرضى الي مجموعتين. المجموعة الأولى: المرضى الذين تم تحويلهم من مركز علاج التسمم بمستشفيات جامعة عين شمس، المجموعة الثانية المرضى الذي تمت إحالتهم من مراكز الرعاية الصحية الأخرى مع تحليل نتائجهم طويلة المدى مثل (النبوبة المعدية المغذية، التوسيع بالمنظار، توصيل القولون، استئصال المريء ر ، الجراحة التصحيحية لانسداد مخرج المعدة ، الإعاقة طويلة الأمد ، ومعدل الوفيات)

النتائج: استقبل مركز علاج التسمم بمستشفيات جامعة عين شمس 661 طفلاً مريضاً خلال (2014-2018) مع وجود تسمم بالقلويات بنسبة (89.5%). كانت الأعراض المعوية هي الرئيسية لأكثر من 50% من الحالات. استقبل قسم جراحة الأطفال 59 من المرضى المحولون من مركز علاج التسمم بمستشفيات جامعة عين شمس (المجموعة الأولى) ، و 178 محولون من مراكز رعاية صحية اخري (المجموعة الثانية). على الرغم من أن مضاعفات طويلة المدى (ثقب القصبه الهوائية الدائم ، وإصابة الحنجرة ، والأنبوبة المعدية المغذية الدائمة) تم تسجيلها فقط في المجموعة الثانية ، إلا أن الحاجة إلى تغذية الأنبوبة المعدية أكثر في (المجموعة الثانية) ، كان هو الاختلاف الوحيد ذو أهمية الأحصائية.

الخلاصة والتوصيات: المرضى الأطفال الذين يعانون من التسمم الحاد بالمواد الكاوية لديهم نتائج طويلة المدى أفضل إذا تمت علاجها في البداية في مركز علاج تسمم متخصص مثل مركز علاج التسمم بمستشفيات جامعة عين شمس. يعد توحيد بروتوكولات العلاج ، وإنشاء قنوات اتصال مع مراكز السموم المتخصصة ، والتسجيل المحلي لمرضى التسمم الحاد بالمواد الكاوية في الأطفال أمرًا إلزاميًا.

➤ Appendix

The established Protocol of management of pediatric diagnosed as acute corrosive injury on arrival at PCCAUH is illustrated in Table 1. The protocol of management at pediatric surgery department is shown in figure 1 and 2.

Table 1: Management of a new pediatric case with corrosive injury at PCCASUH

<p style="text-align: center;">Emergency Evaluation for</p> <p style="text-align: center;">1- Airway: Consult for tracheotomy 2- Circulatory Status: Antishock therapy 3- Caustic skin Burns: Consult Plastic Surgeon</p>
<p style="text-align: center;">Admit at Observation Room for 6 hours</p> <p>1- Local pain killer as lignoquine and local anti-inflammatory as gingiva violet. 2- Trial of swallowing a small amount of milk 15-30ml.</p>
<p style="text-align: center;">If the patient can swallow</p> <p>1- Discharge on oral steroid (phenadon dose: 1 mg/kg/day for 3 days and tapered along 6 days) for 9 days 2- Antibiotics (3rd generation cephalosporines 50mg/kg/d) and local anti-inflammatory as gingiva violet. 3- Advice of reconsultation if dysphagia, vomiting, hematemesis or melena</p>
<p style="text-align: center;">If the patient cannot swallow</p> <p>1- Admit at inpatient for on antibiotics (50mg/kg/d 3rd generation cephalosporines), hydrocortisone (0.5 mg/kg/day, antacids and antiemetics 2- Local panthenol and gengive violet 3- Symptomatic treatment of wheezy chest (Nebulizer) & X ray, 4- Fluids and electrolyte infusion for dehydration and electrolyte imbalance</p>
<p style="text-align: center;">ICU admission if:</p> <p>1- Sever vomiting and dehydration for anti-shock measures and circulatory support. 2- Hematemesis and melena for anti-bleeding measures, PPI and blood transfusion. 3- Sever skin burn</p>
<p style="text-align: center;">When to consult pediatric surgeon?</p> <p>1- Persistent hematemesis and melena not responding to anti-bleeding measures 2- Signs of esophageal or gastric perforation 3- Persistent dysphagia more than 1 week (for Gastrostomy or Jeujonostomy) 4- Esophageal stricture proved by Contrast Study</p>

Figure 1: protocol of Management of Pediatric Surgery department in the Emergency management of caustic ingestion

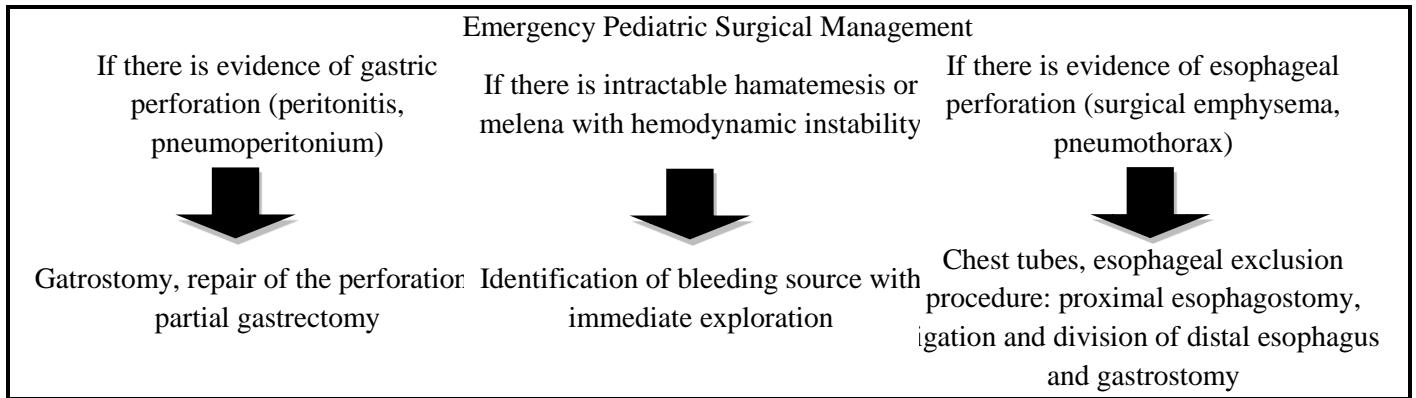


Figure 2: protocol of Management of Pediatric Surgery department in the Elective management

