

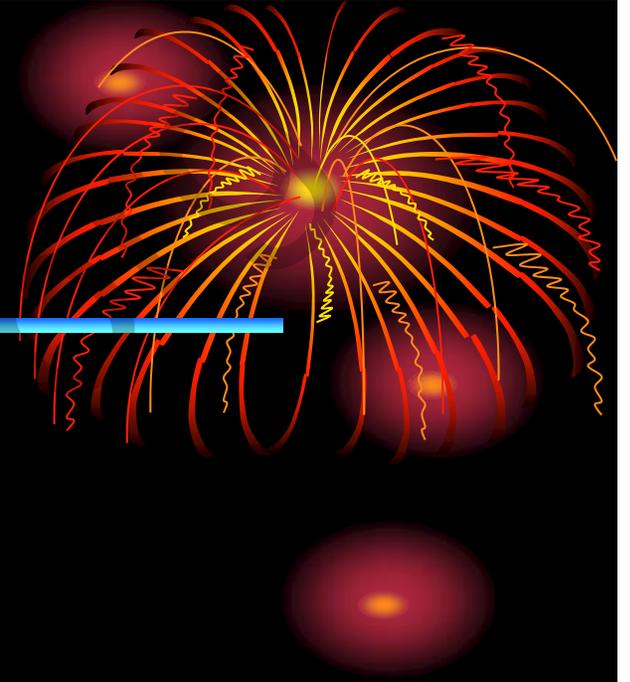
The 5th Pediatric GI Days
" Pediatric GI & Liver Emergency :
Current Practical Management "



Caustic injury

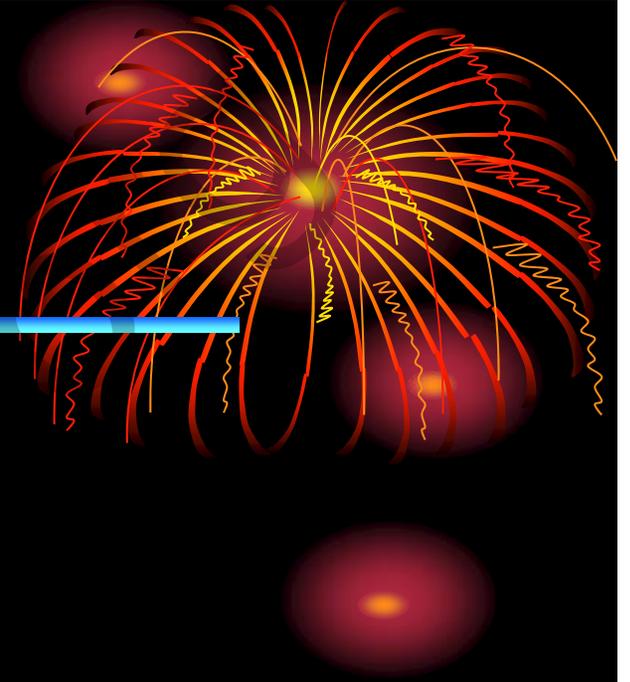
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Pediatric Department,
Khon Kaen Regional Hospital
18 July 2013***

Outlines



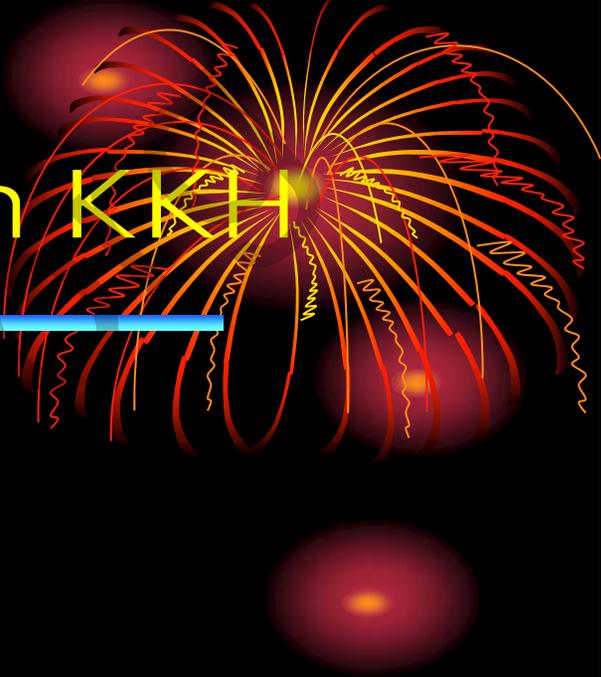
- Introduction
- Type & mechanism
- Clinical manifestations
- Management & complications
- Severe corrosive ingestion in KKH
- Prevention
- Summary

Introduction



- Pediatric GI emergency
- Most often in first 3 years of life
- Most ingestions by children are accidental
- 75% of accidental ingestion: 2nd containers
- Adolescents & young adult: related to attempted suicide (more severe)

Corrosive ingestion : In KKH



- 2008 -2012
- N = 5 (M 2 , F3)
- Mean age = 4

- 4 ingested acid
(HCl , 2 sulfuric acid,
formic acid)
- 1 ingested weak base

- All from *secondary container*
- 4/5 EGD : abnormal 2 cases , normal 2 cases

Mechanisms of damage to UGI tract

- Strong alkaline:
- liquify tissue by dissolving & saponifying lipid
- producing liquefactive necrosis
- damages varies from minor erythema to deep ulceration or perforation



Drain cleaner



Detergent



Oven cleaner



Hair relaxer

Mechanisms of damage to UGI tract



Toilet cleaner



Lead acid battery

- Strong acid:
- coagulate proteins
inhibit deeper
damage
- producing
coagulative necrosis
- Eschar formation

Mechanisms of damage to UGI tract

- Medication in pill : pill esophagitis
- Solid foreign bodies : perforation, pressure necrosis



Pill esophagitis



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Clinical manifestations



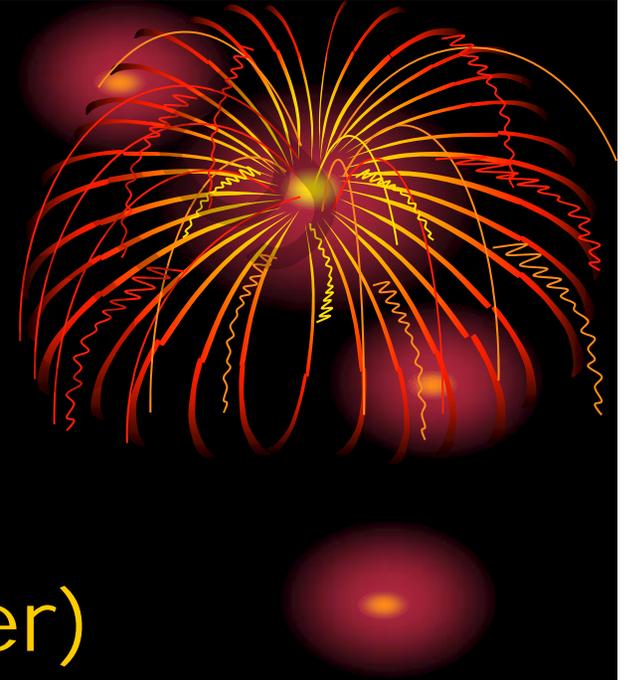
- Dysphagia
- Drooling
- Oropharyngeal burn
- Retrosternal & Abdominal pain & vomiting

- Hematemesis
- Features suggesting upper airway injury
(stridor, hoarseness, nasal flaring, retractions)
- ARDS

Clinical signs

- Drooling
- mucosal injury
(Erythema, swelling, ulcer)

Lack of visible damage in the mouth
dose not preclude damage in lower
in gut



Principle of management



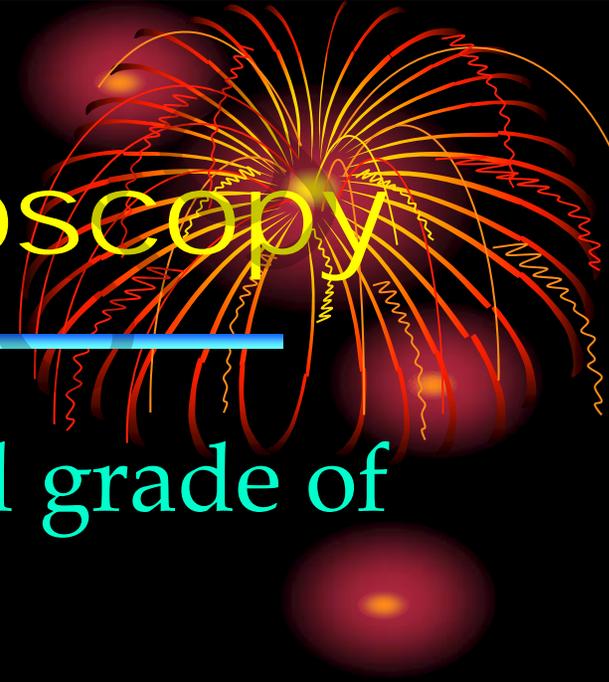
- Stabilize ABCs, appropriate treatment of airway injury and hypotension
- Intubation may be necessary in respiratory distress
- External decontamination by copious irrigation with water 10 -15 min.
- History should focus on
 - agent involved
 - amount, time of ingestion
 - intention (severe)
 - child abuse
(very small children & infants)

General management

- Do not induce emesis
- No gastric lavage or activated charcoal
- Neutralization should be avoid
- *Dilution with water or milk may be useful (intermediate)*
- NPO
- Intravenous fluid
- Chest X-ray
- Emergency endoscopy



Objective for Endoscopy



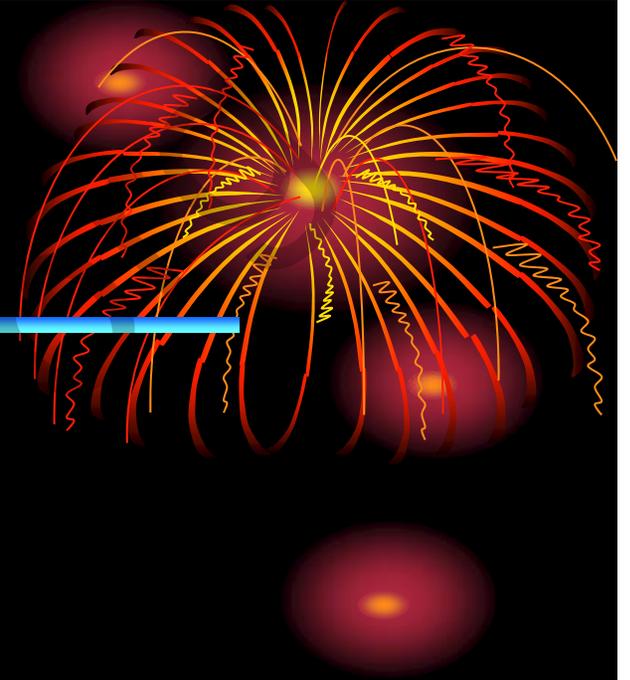
- Categorize the extent and grade of injury
 - visible damage
 - circumferential ulceration (grade 2b or greater)
 - organs are involved
- Guided for treatment and indicated prognosis

When Endoscopy



- Endoscopy if indicated “ warning sign ”
 - Favor “Early endoscopy ” > late endoscopy
 - Within 24 hours if possible
 - Appropriate to identify the full extent of injury
 - Should be avoid during 5 - 15 days post ingestion
- None of warning sign : watch and observe

Warning signs



- Drooling
- Dysphagia
- Abdominal pain & vomiting
- Visible mouth lesions
- Airway embarrassment
- Intentional ingestion

Zargar 's classification of caustic injury

(1991)

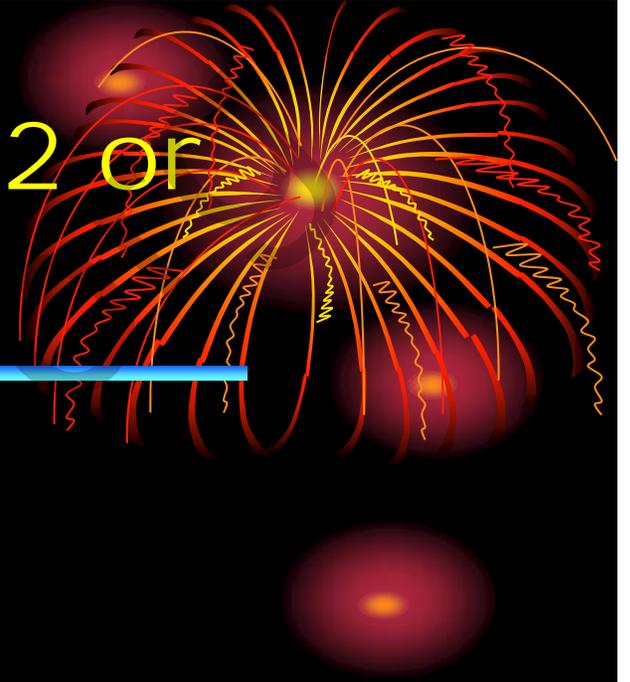
<i>Grade</i>	<i>Visible appearance</i>	<i>Clinical significance</i>
0	Hx+ve, no symptom&visible damage	Able to take fluids immediately
1	Edema, loss of normal vv pattern, hyperremia, no transmucosal injury	Temporary dysphagia, able to swallow within 0-2 days, no long term sequelae
2a	Transmucosal injury, friability, hemorrhage, blistering, exudate, scattered superficial ulceration	Scarring, no stenosis, no long term sequelae
2b	2a plus deep discrete ulceration and/or circumferential ulceration	Small risk of perforation,scarring may result in later stenosis
3a	Scattered deep ulceration with necrosis of tissue	Risk of perforation, high risk of later stenosis
3b	Extensive necrotic tissue	High risk of perforation and death, high risk of stenosis

Management of grade 2a or less

- Adequate nutrition
(by mouth if possible)
- Repeat endoscopy at 2-3 wk
(optional)



Management of grade 2 or higher



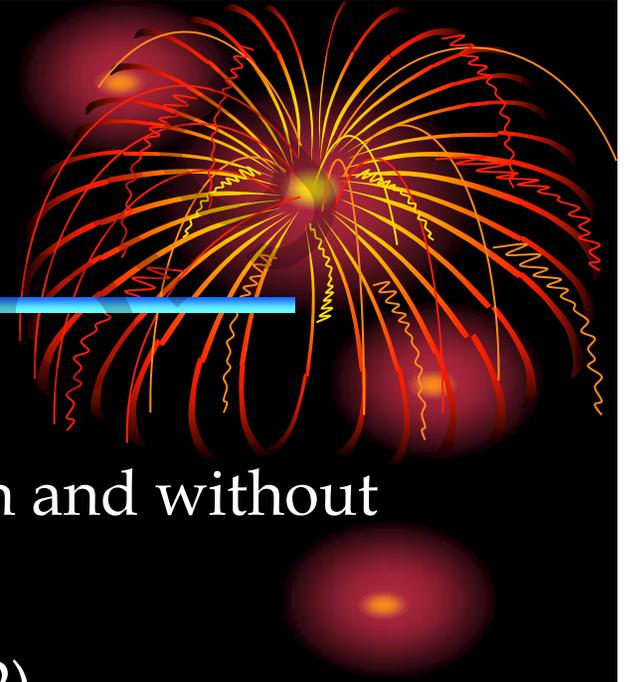
- ICU care
- Nutritional supplement : TPN
- Maintain acid reduction therapy (PPI twice daily) until completed healing
- Considered long term prophylaxis acid-suppressing Rx
- ATB; grade 2b or greater or fever
- Retained NG tube for feeding & stent

Corticosteroids : friend or foe ?



- ❖ Still controversy in prevention of stricture
- ❖ May have use in the second or third degree injury
- ❖ Prednisolone 1- 2 mg/kg/day to a maximum of 60 mg/day , tapered over a -3- week course
- ❖ Only a single controlled trial: Dexamethasone 1MKD may be benefit
(Bautista et al,Eur Pediatr Surg 1996:198-203)
- ❖ High dose steroids for several weeks: increase complication

Corticosteroids (2)

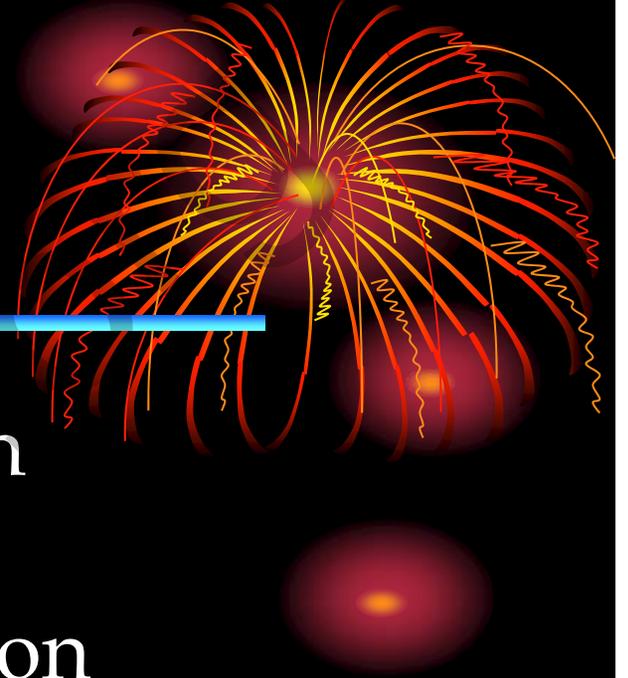


- **Systematic review** , 6 studies in Europe
(2=steroid,2= no steroid,2 compared with and without steroid) (steroid x 8 days)
- Pts with 2nd and 3rd degree burns (N=572)
- 305 pts (**35.1%**) **with steroid** VS 267 pts (**33.3%**) **without steroid** developed stricture
- Steroids ***do not*** prevent the development of strictures and may lead to the development of serious adverse effects

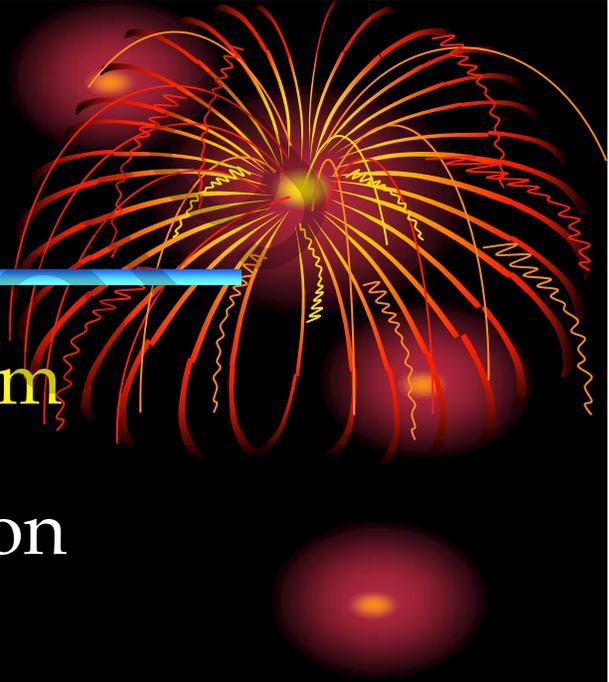
(Peldova et al, Toxicol Rev,2005:125-9)

Complications

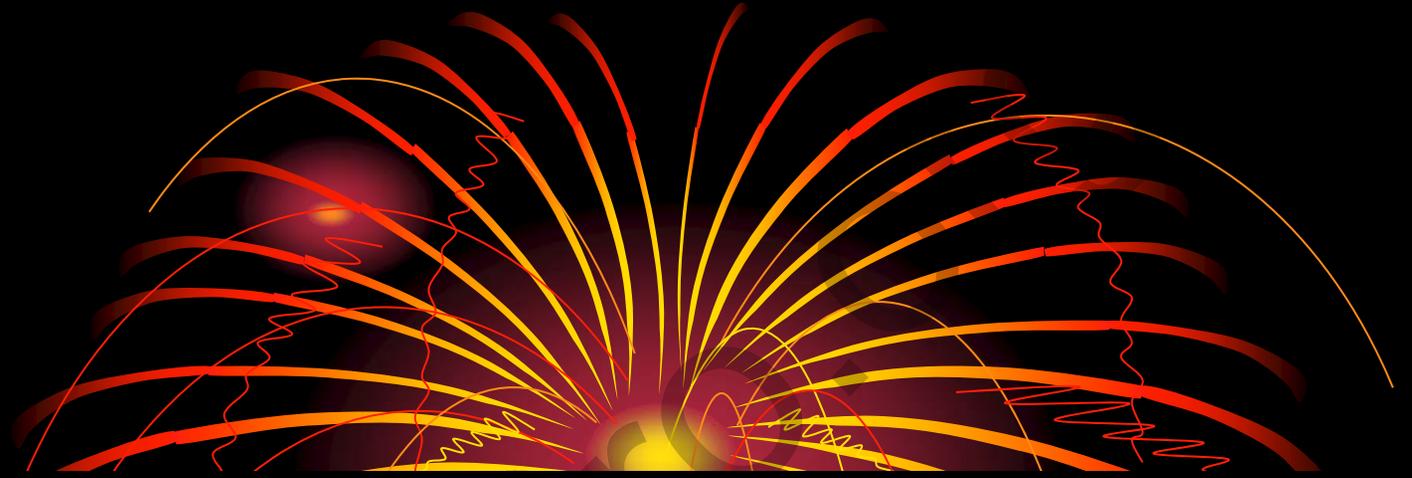
- Lip, mouth, oropharyngeal burn
- Airway obstruction
- Esophageal & gastric perforation
- Mediastinitis
- Tracheoesophageal fistula
- Stricture formation
- Pyloric stenosis
- Late development of carcinoma



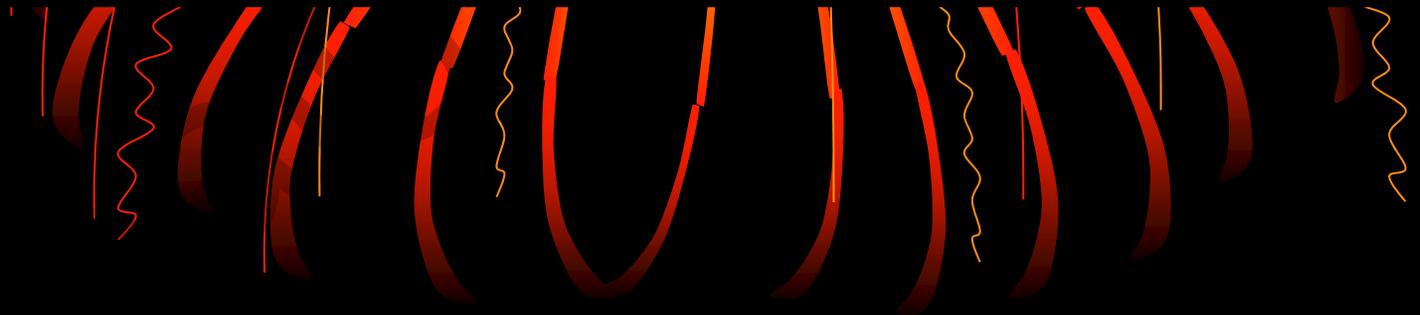
Follow up



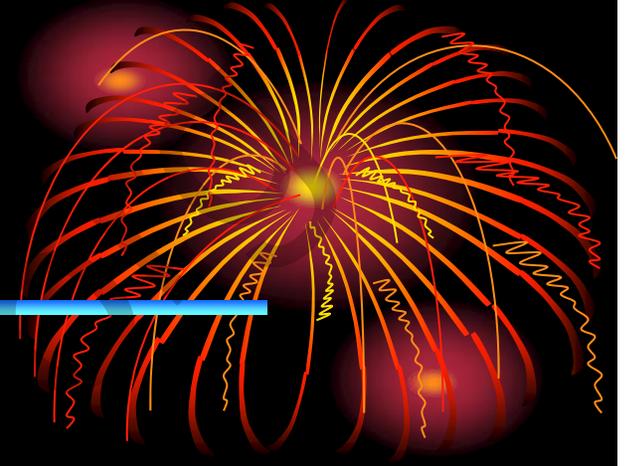
- ❑ Grade 2 or greater : esophagogram
- ❑ If present stricture, started dilatation
- ❑ Application of Mitomycin C or other agent (halofunginone)
- ❑ Other modality: laser or surgery
- ❑ Monitor other late complication
 - Sliding hiatus hernia & GERD
 - Motility disorder
 - Pulmonary aspiration & chronic pulmonary disease
 - Esophageal cancer



Severe corrosive ingestion : experience in KKH

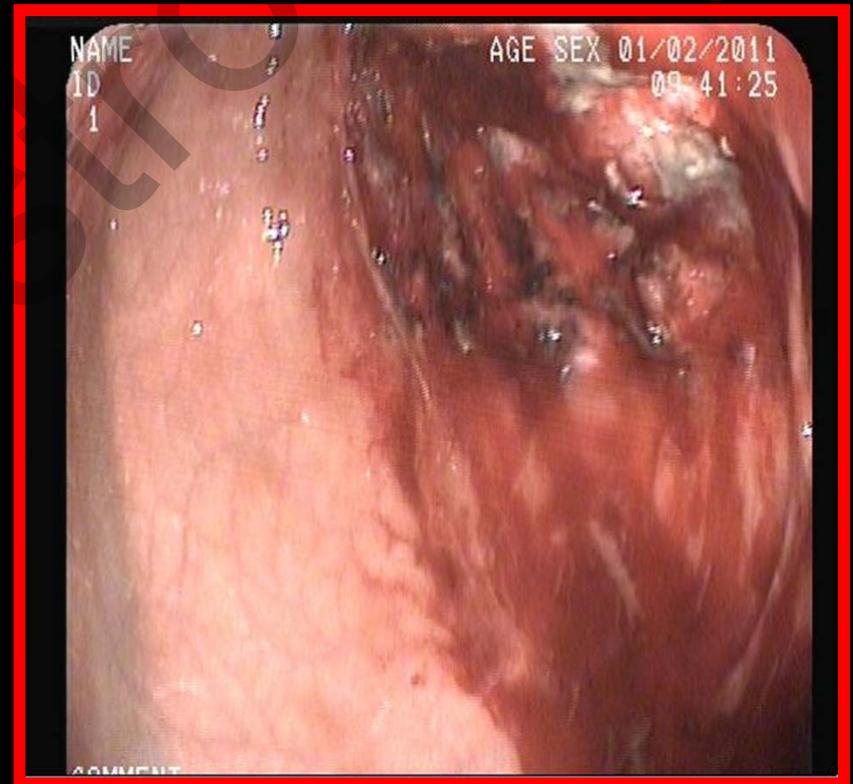
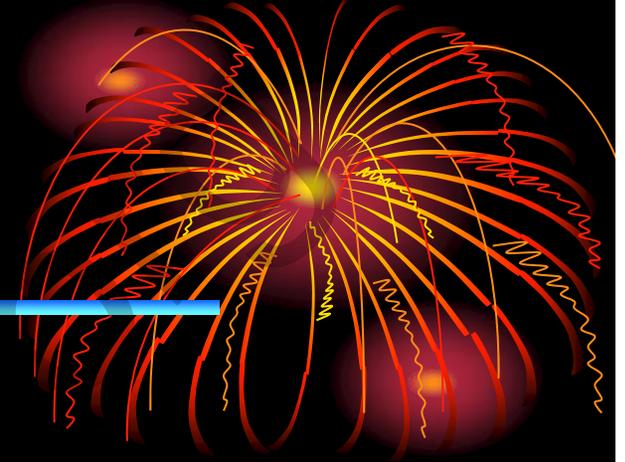


In KKH : case 1



- A 3 - yr - old girl
- Accidentally ingested formic acid in **secondary container**
- Exfoliative skin and swelling of upper and lower lips
- Erythema of oral mucosa
- Stridor due to UAO

Case 1 : EGD



Case 1 : hospital course



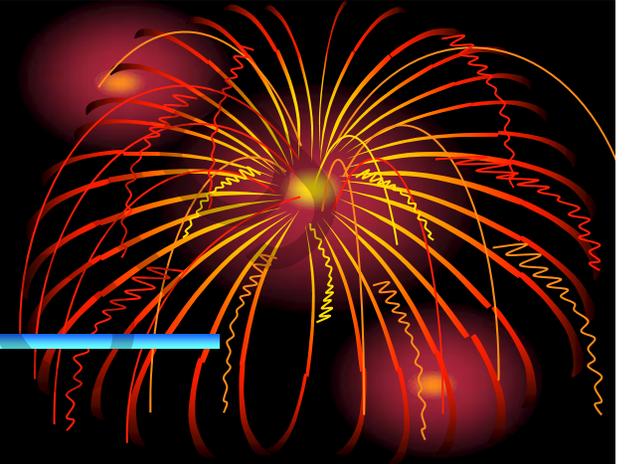
- Tracheostomy
- UGI study 1 mo after : no stricture

Case 1 : hospital course

- 3 mo after develops dysphagia and drooling : esophageal stricture
- Perform esophageal dilatation



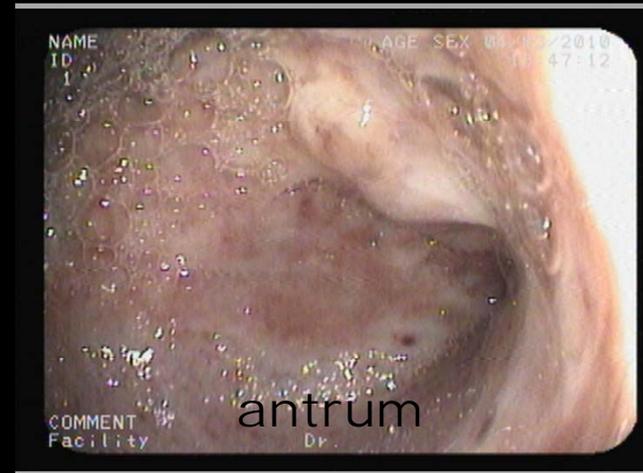
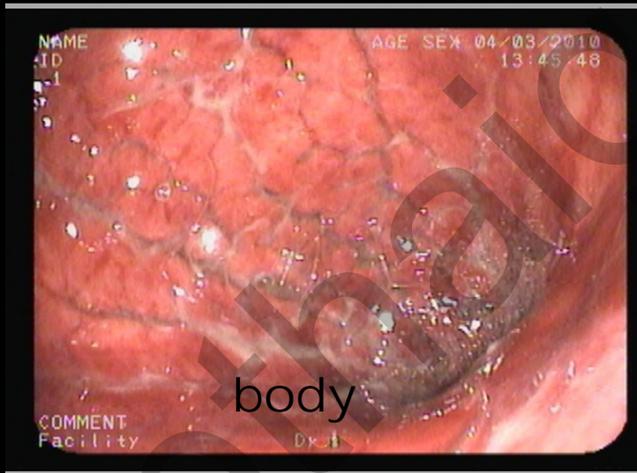
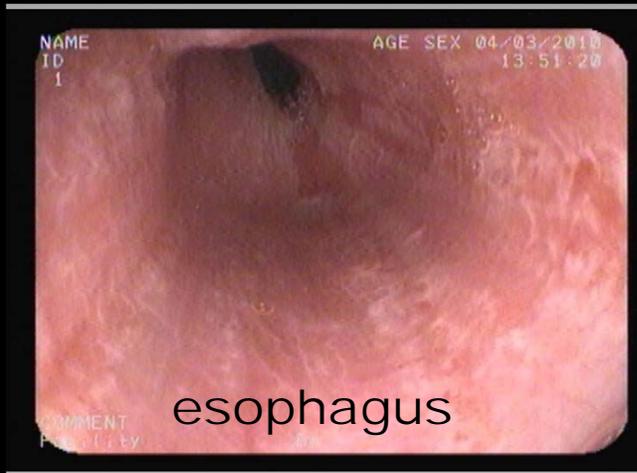
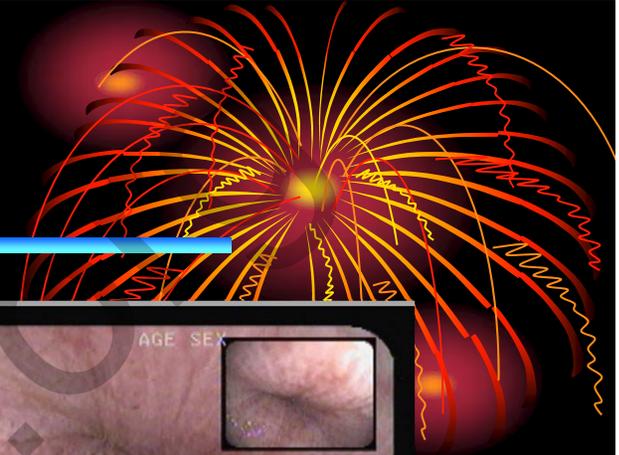
In KKH : case 2



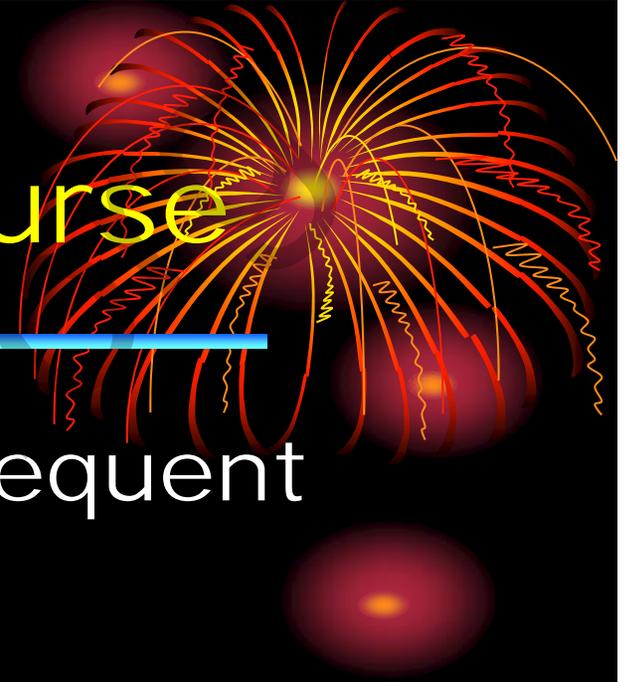
- A 2 -yr - old boy
- Accidentally ingested toilet cleaner
(VIM ® , *hydrochloric acid 13% w/w*)
in **secondary container**
- V/ S : stable
- Erythema in oral cavity
- No stridor



Case 2 : EGD

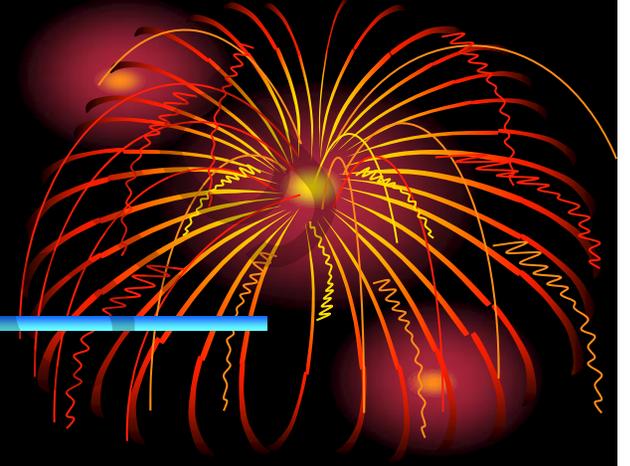


Case 2 : hospital course



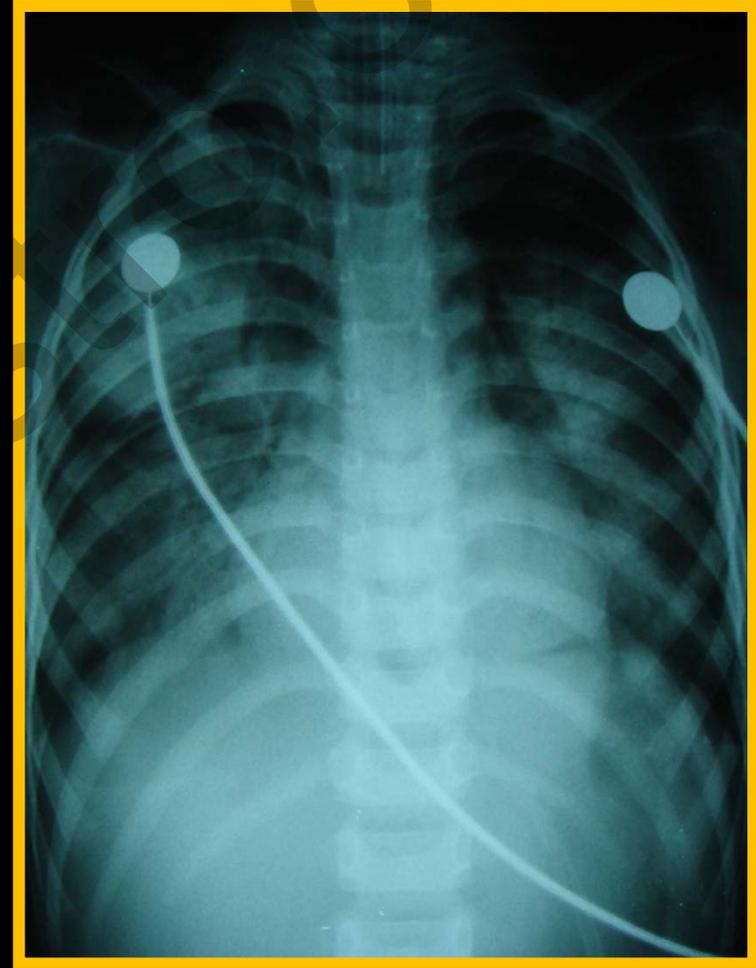
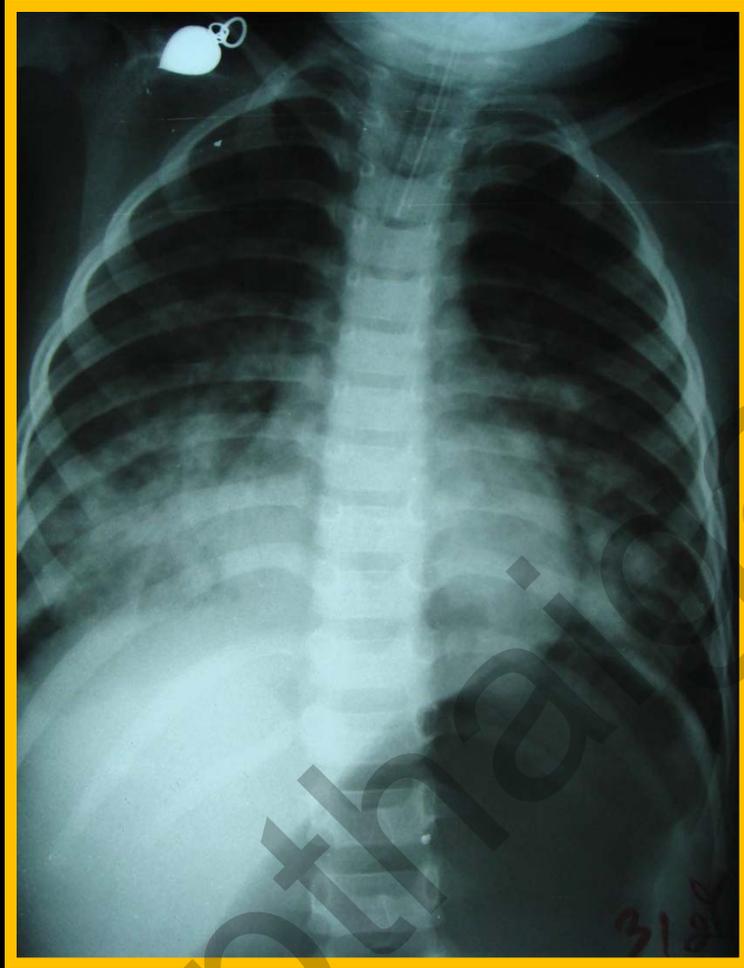
- 1 mo after : develops frequent vomiting
- UGI study : gastric outlet obstruction
- Perform gastro-jejunostomy

In KKH : case 3



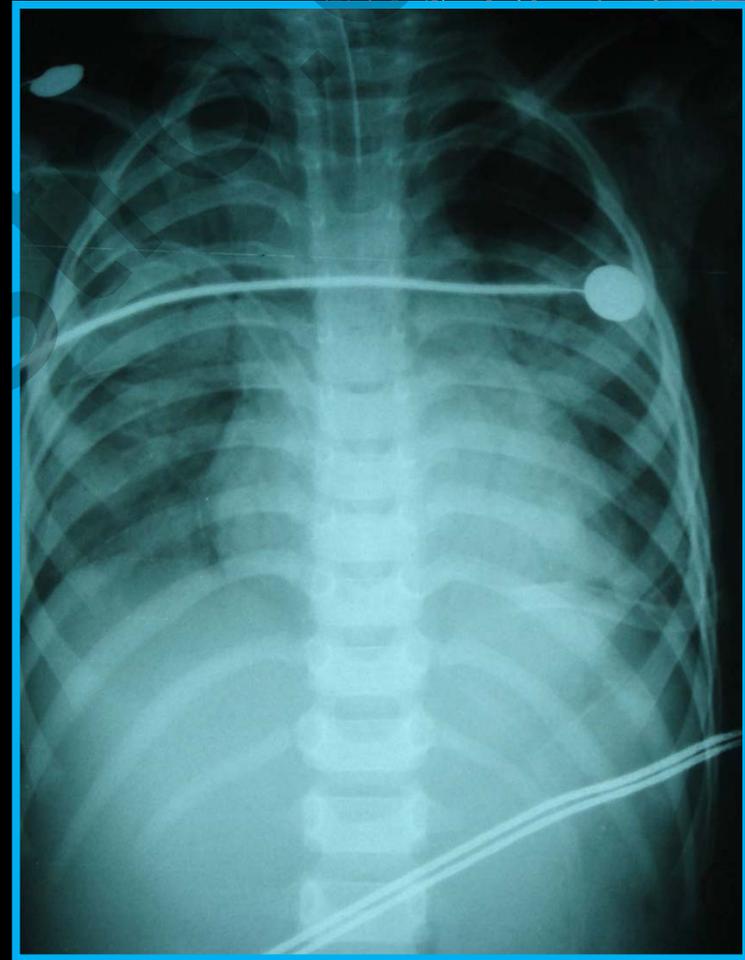
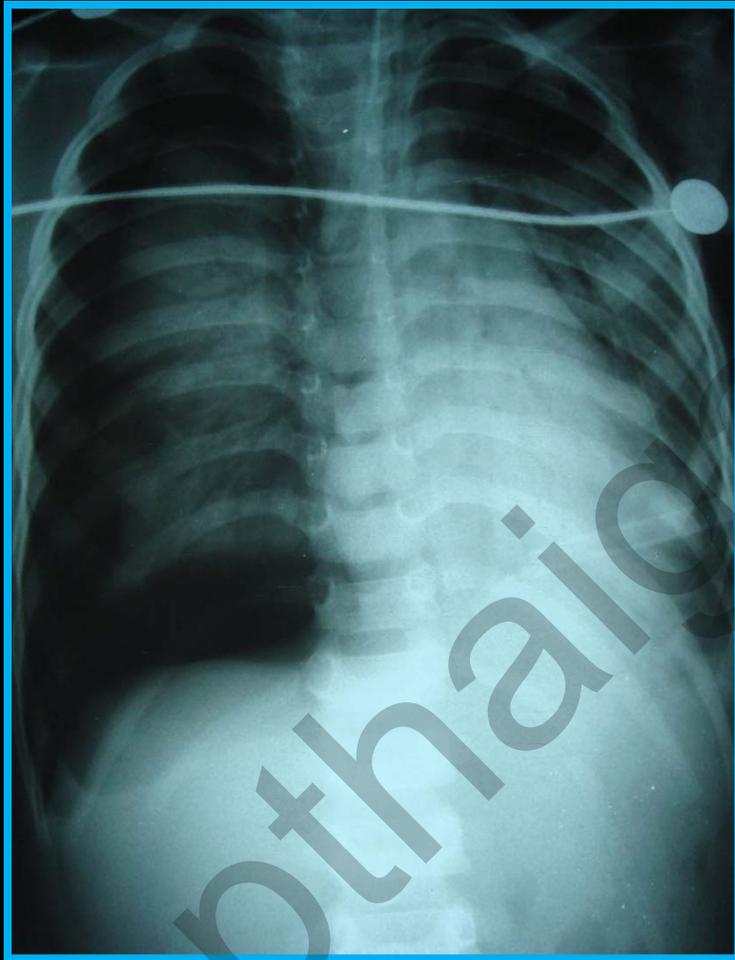
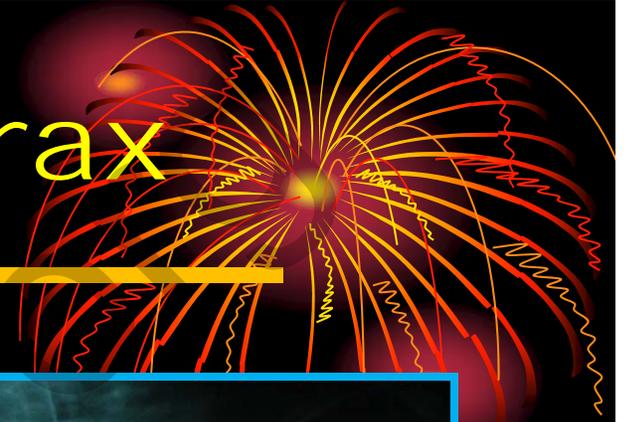
- 4 -yr-old boy
- Accidentally ingested of glass cleaners in **secondary container**
(Isopropyl alcohol ,Na lauryl ether sulfate ,ethylene glycol N-Butyl ether)
- Drooling ,abdominal pain and vomiting
- 3 hours after ,dysnea : on ETT
- No endoscopy

Case 3 : Chemical pneumonitis



Day 1

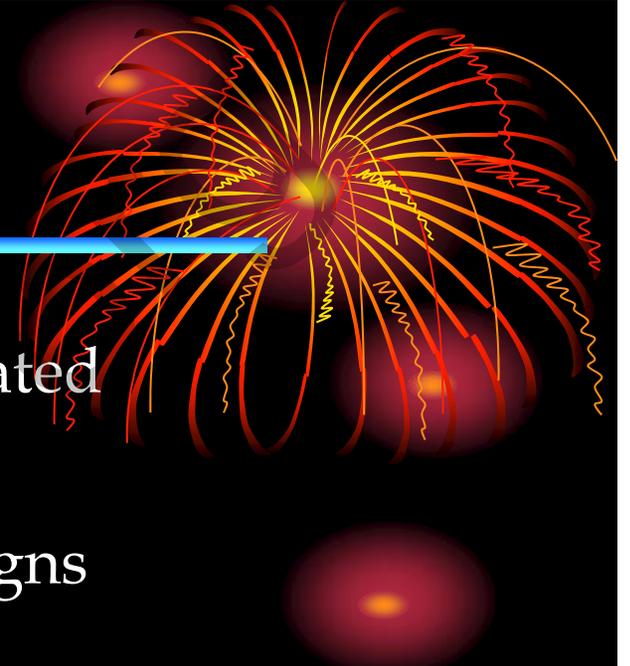
Case 3 : pneumothorax



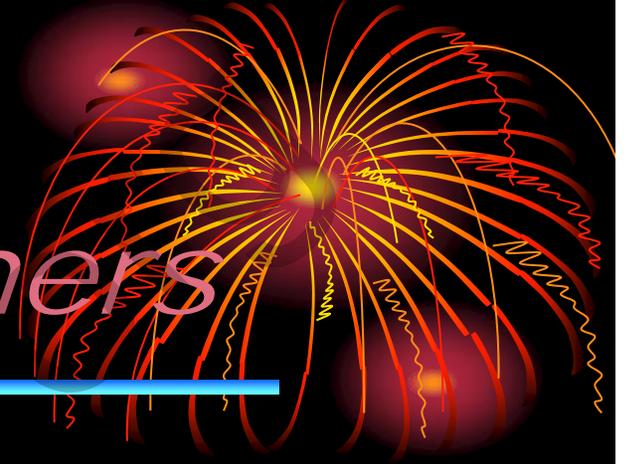
Day 3

Prevention

- Banned sale of granular and concentrated household cleaners
- Child-safe containers with warning signs
- Sale of secondary containers should be banned
- Safe storage
- Warnings on disk battery or toys packages
- Fluid before pill medication and upright position



Prevention : secondary containers



Prevention : childproof cap



Prevention : warning sign



Summary :

Do not induce emesis, lavage, neutralization, NPO, IV fluid

Acute abdomen series if suspected perforation

Consider EGD within 12 hr after congestion

Grade 0- 1

Grade 2

Grade 3

Supportive Rx
start oral feeding
D/C with education

NG placement after EGD
consider steroid &ATB&
PPI & NPO1wk

NG placement after EGD
consider steroid &ATB&
PPI
NPO1wk,start TPN

Esophagogram 3 wk after ingestion

Esophageal stricture

No stricture

Esophageal dilatation

D/C & F/U
injury prevention & education

Thank you

