

Caustic Ingestions

Symptoms as Predictors of Esophageal Injury

Ellen F. Crain, MD, PhD; Jeffrey C. Gershel, MD; Andrew P. Mezey, MD

• The ingestion of a caustic substance can lead to severe damage to the esophagus. Currently, esophagoscopy is recommended for all patients with a history of caustic substance ingestion because clinical criteria have not proved to be reliable predictors of esophageal injury. The records of 79 consecutive patients younger than 20 years who were first seen with a history of corrosive ingestion were reviewed. The presence or absence of three serious signs and symptoms—vomiting, drooling, and stridor—as well as the presence and location of oropharyngeal burns were compared with the findings on subsequent esophagoscopy. Fifty percent (7/14) of the patients with two or more of these serious signs and symptoms (vomiting, drooling, and stridor) had serious esophageal injury as compared with no positive endoscopic results in the group with none or only one of these clinical findings. The presence of oropharyngeal burns did not identify patients with serious esophageal injury. These results suggest that the presence of two or more signs or symptoms in patients with a history of caustic substance ingestion may be a reliable predictor of esophageal injury.

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The indications for esophagoscopy in patients with a history of possible caustic substance ingestion remain problematic. Previous studies have documented a small but significant risk of serious esophageal injury even in the

absence of oropharyngeal burns.¹⁻³ One cannot rely solely on the presence and location of oropharyngeal lesions to determine which patients should undergo esophagoscopy.³⁻⁸ However, this procedure does involve some risk and economic costs,^{9,10} so it would be helpful if one could identify certain signs and symptoms that might predict esophageal injury and lessen the need for endoscopy.

Recently, Gaudreault et al¹¹ found no significant relationship between esophageal injury and the presence of *any* signs or symptoms, including nausea, vomiting, dysphagia, refusal to drink, abdominal pain, increased salivation, oropharyngeal burns, or abdominal tenderness. These investigators did report stronger relationships between esophageal burns and four specific symptoms—vomiting, dysphagia, drooling, and abdominal pain—but they did not statistically evaluate the extent of those relationships.

In contrast, our clinical experience suggested that *certain* serious signs and symptoms—vomiting, drooling, and stridor—correlate with severe esophageal injury. We expected that patients with serious esophageal damage should have vomited or be drooling by the time they are seen in an emergency department. Stridor, reflecting laryngeal swelling, would indicate that a substantial amount of caustic material had been swallowed. We hypothesized, more specifically, that the most powerful predictor of esophageal injury would be a combination of *two or more* of these signs and symptoms, since, for example, vomiting alone or drooling alone might be a consequence of oropharyngeal burns in the absence of esophageal injury. As opposed to vomiting or drooling, stridor would be

unlikely to occur unaccompanied by other serious signs or symptoms, since a burn extensive enough to cause laryngeal swelling should also lead to drooling and perhaps even to vomiting. Thus, the presence of two or more of these signs and symptoms should raise the emergency physician's suspicion that serious esophageal injury might have occurred.

PATIENTS AND METHODS

Seventy-nine patients younger than 20 years were first observed at the Bronx (NY) Municipal Hospital Center between 1971 and 1983 with a history of caustic substance ingestion. Every patient was examined in the emergency department, where the presence or absence of vomiting, drooling, and stridor, and the location of any oropharyngeal burns (lip— anterior part of the mouth and/or pharynx) were specifically recorded on a standardized form. All patients were then hospitalized, regardless of symptoms and signs, and all underwent esophagoscopy between 12 and 24 hours after admission. The initial evaluation, therefore, was unaffected by the subsequent endoscopic findings. The endoscopies were performed by an attending thoracic surgeon or otolaryngologist, whose interpretations were used as the criteria for analysis. A positive endoscopic finding was defined as a second or third-degree esophageal burn (mucosal ulceration) while first-degree burns (mucosal erythema only) were considered to be “negative” findings, since these more superficial injuries do not lead to stricture.^{2,7,8} In all cases, the endoscope was passed either through the entire esophagus or until an area of circumferential second-degree or third-degree burn was encountered.

RESULTS

Sixty-five (82%) of the 79 patients were 4 years old or younger and had accidentally ingested the corrosive. Three patients (4%) were between 5

From the Department of Pediatrics (Drs Crain, Gershel, and Mezey) and the Division of Ambulatory Care (Drs Crain and Gershel), Bronx (NY) Municipal Hospital Center, Albert Einstein College of Medicine.

Reprint requests to 1 West 20, Jacobi Hospital, Pelham Parkway South and Eastchester Road, Bronx, NY 10461 (Dr Crain).

	No. (%) of Patients	No. With Positive Esophagosopic Findings	No. With Stricture
Lye			
Crystals	47 (59)	2*	1
Liquid	13 (17)	2	1
Total	60 (76)	4	2
Ammonia	7 (9)	0	0
Oven cleaner	7 (9)	1	0
Clinitest tablet	4 (5)	1	1
Cresylic acid	1 (1)	1	0

*The two patients with stridor were in this group.

No. of Signs and/or Symptoms	Esophagosopic Results	
	Negative	Positive†
0	43	0
1	22	0
≥2	7	7

* $\chi^2 = 35.6597$ (1 *df*), $P < .001$.

†Second- or third-degree burns.

and 12 years of age. Of the 11 patients (14%) between 13 and 20 years of age, at least six were making a suicide attempt or gesture, one had a history of serious psychiatric illness, and one was taking hallucinogenic drugs at the time. The circumstances surrounding the ingestion in the other three adolescents were unclear. Only two of the adolescent patients had any signs or symptoms; both had a history of vomiting. No adolescent had positive endoscopic findings.

All but one patient ingested an alkali caustic (Table 1). Drain cleaner was the substance most frequently ingested (76% of the cases), followed by oven cleaner, ammonia, and Clinitest tablets.

Our major hypothesis was that the presence of at least two serious signs or symptoms should distinguish between patients with esophageal injury and those without. As seen in Table 2, half (seven) of those with two or more serious signs or symptoms had positive endoscopic findings whereas none of the 65 remaining subjects had serious esophageal injury ($\chi^2 = 35.66$, $P < .001$). A complete description of the distribution of clinical symptoms and location of oropharyngeal burns is presented in Table 3.

The presence of oropharyngeal burns did not significantly correlate with esophageal injury (Table 3). Nine percent (6/69) of patients with oropharyngeal injuries and 10% (1/10) of subjects with no oropharyngeal lesions had positive endoscopic findings ($\chi^2 = .01$, $P > .7$). Furthermore, the combination of oropharyngeal burns and two or more serious signs and symptoms was not superior to two or more serious signs and symptoms

Symptoms	Burn Location			
	None	Lip—Anterior Part of Mouth	Pharynx	Lip—Anterior Part of Mouth and Pharynx
None				
Negative*	6	34	0	3
Positive*	0	0	0	0
Vomiting only				
Negative	3	7	0	1
Positive	0	0	0	0
Drooling only				
Negative	0	9	0	2
Positive	0	0	0	0
Drooling and vomiting				
Negative	0	3	0	4
Positive	1†	0	0	4
Drooling and stridor				
Negative	0	0	0	0
Positive	0	1	0	0
Vomiting, drooling, and stridor				
Negative	0	0	0	0
Positive	0	0	0	1

*Negative and positive esophagosopic results.

†Clinitest tablet ingestion.

alone at identifying patients with serious esophageal injury.

To assess whether differences between our report and that of Gaudreault et al¹¹ reflect differences in the two series of patients or in the criteria used to identify patients with esophageal injury, we attempted to replicate their analysis. If the presence of any oropharyngeal burns is included among our serious signs and symptoms, our results would support their finding of no association between signs and symptoms and esophagoscopy results. Sixty-six (90%) of our 73 patients who had any symptoms (vomiting, drooling, and/or stridor) and/or any oropharyngeal burn had negative esophagosopic findings, while all six

patients with none of these findings had no esophageal injury ($\chi^2 = 0.6313$, $P > .40$).

At follow-up, only three patients (4%) had esophageal strictures develop. All had at least two serious signs and symptoms noted at initial observation and had "positive" esophagosopic findings. Two of these patients had vomiting and drooling, while the third had vomiting, drooling, and stridor. Other than these three, none of our subjects later had complaints or problems that could be related to the corrosive ingestion episode.

COMMENT

In contrast to the findings of Gaudreault et al,¹¹ these results suggest

that esophagoscopy may not be routinely required in patients with a history of caustic substance ingestion. Although the present data were obtained by reviewing patient records, the significant correlations did not emerge from combining the data in a post hoc fashion. Rather, previous clinical experience suggested that three specific signs and symptoms—vomiting, drooling, and stridor—particularly in combination, would have predictive power. In the present sam-

ple there were no positive esophagoscopy findings in the group of patients with either no symptoms or only one symptom, while half of the subjects with two or more of these serious signs and symptoms had serious esophageal injury. These findings also confirm the notion that the presence of oropharyngeal burns is an unreliable indicator of more distal esophageal injury.

Although the percentage of patients in our sample with positive esophagoscopy findings is similar to that found

in other surveys, the actual number was not great enough for us to advocate a change in management at this time. However, if the findings from other centers support our conclusions, criteria can be developed for identifying patients truly at risk for serious esophageal injury who should undergo endoscopy.

Ruth E. K. Stein, MD, Michael I. Cohen, MD, and William C. Crain, PhD, commented on the manuscript.

References

1. Borja AR, Randsell HT, Thomas TV, et al: Lye injuries of the esophagus: Analysis of 90 cases of lye ingestion. *J Thorac Cardiovasc Surg* 1969;57:533-538.
2. Hawkins DB, Demeter MJ, Barnett TE: Caustic ingestion: Controversies in management: A review of 214 cases. *Laryngoscope* 1980;90:98-109.
3. Haller JA, Andrews HG, White JJ, et al: Pathophysiology and management of acute corrosive burns of the esophagus: Results of treatment in 285 children. *J Pediatr Surg* 1971;6:578-583.
4. Kirsh MM, Peterson A, Brown JW, et al: Treatment of caustic injuries of the esophagus: A ten year experience. *Ann Surg* 1978;188:675-678.
5. Tucker JA, Yarrington T Jr: The treatment of caustic ingestion. *Otolaryngol Clin North Am* 1979;12:343-350.
6. Middlekamp JN, Ferguson TB, Roper CL, et al: The management and problems of caustic burns in children. *J Thorac Cardiovasc Surg* 1969;57:341-347.
7. Cardonna JC, Daly JF: Current management of corrosive esophagitis: An evaluation of results in 238 cases. *Ann Otol Rhinol Laryngol* 1971;80:521-527.
8. Oakes DD, Sherck JP, Mark JB: Lye ingestion: Clinical patterns and therapeutic implications. *J Thorac Cardiovasc Surg* 1982;83:194-204.
9. Luc M, Gullo HC, Malt RA: Esophageal perforation. *Ann Thorac Surg* 1982;33:203-210.
10. Berry BE, Ochsner JL: Perforation of the esophagus: A 30 year review. *J Thorac Cardiovasc Surg* 1973;65:1-7.
11. Gaudreault P, Parent M, McGuigan M, et al: Predictability of esophageal injury from signs and symptoms: A study of caustic ingestion in 378 children. *Pediatrics* 1983;71:767-770.

Medical Vignettes

Abraham Jacobi, 1830-1919

Abraham Jacobi, considered by many to be the father of pediatrics, was born in Westphalia, Prussia, in 1830. He escaped from a repressive Europe and migrated to the Bowery where he established a general practice in 1853. (His charge for office visits was 25 cents!) He lectured extensively on the care of infants and children and became a professor of infantile pathology and therapeutics at New York Medical College. Subsequently, he established the first chair in pediatrics at Columbia University, New York. For 60 years, he reigned as the intellectual protagonist for children's health, nutrition, and welfare. Among his contributions were (1) intubation for laryngeal diphtheria, (2) the use of boiled milk for infants, (3) the first use of roentgenograms in the diagnosis of children's disorders, (4) advocacy for rearing of children in homes and not in institutions, (5) the founding of Lenox Hill Hospital, New York, (6) establishing the first infant tuberculosis facility, and (7) establishment of the first bedside teaching service for clinical instructors in pediatrics. Dr Jacobi died in 1919 (Veeder BS: *Pediatric Profiles*. St Louis, CV Mosby Co, 1957).